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SLEEPING SICKNESS.

League of Nations. Health Organisation. **Interim Report of the League of Nations International Commission on Human Trypanosomiasis.**—147 pp. With 29 figs., 2 maps & 12 plates. C.H.536. 1927. Mar. Geneva.

1. General review of the activities of the Commission (H. L. Duke). pp. 7–15.

The Commission, which consists of Dr. H. L. Duke, British Delegate and Chairman, Dr. van Hoof, Belgian Delegate, Dr. G. Lavier, French Delegate, Prof. Kleine, German Delegate, Dr. Prates, Portuguese Delegate, and Mr. Plevin, Laboratory Assistant, commenced work about the beginning of 1926, and established its headquarters in the Entebbe laboratory. The first few weeks were spent in drawing up a programme of work. The programme is divided into two parts, Epidemiological Studies and Laboratory Work and consisted of the following sections :—

Laboratory Experiments.

" 1. Continue examination of Damba and mainland-shore fly ; also shore-line flies near the Laboratory as control.

" 2. Collect a number of strains of human trypanosomes from different *palpalis* and game-tsetse areas. Compare these strains carefully as regards morphology, transmissibilty, virulence, etc. Search for posterior-nuclear forms in human strains from *G. palpalis* areas.

" 3. Introduce virulent, typical *T. gambiense* into ruminants to ascertain if posterior-nuclear forms develop. Careful study of the behaviour of the trypanosomes in domestic ruminants and, if possible, in wild animals.

" 4. When a virulent strain of trypanosomes is transmitted cyclically by tsetse, is the virulence in any way modified by the transmission ? This bears upon ' introduction of strain ' into new area.

" 5. Infect an animal with two strains of trypanosomes, one virulent, the other mild, and see which strain, if either, is transmitted cyclically.

" 6. Repeat experiments on ' sur-infection ' in susceptible animals to ascertain the effect on the host of repeated doses of : (1) homologous ; (2) heterologous strains.

" 7. Endeavour to impair the resistance of animals, such as baboons, mangabeys, etc., to trypanosomes against which the animals possess a partial or complete natural immunity. Poor food, ankylostomes, Indian ink and histamine may prove a means to this end.

" 8. Attempt infection of baboons, etc., with a mixture of *T. brucei*, *T. rhodesiense* and *T. gambiense*.

" 9. Infect *G. palpalis* with *T. rhodesiense* and, if possible, test on man.

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" 10. Culture experiments with all strains.
" 11. Test effect of Bayer 205 (in doses) on the transmissibility of trypanosomes by tsetse.
" 12. Transmissiblity of relapse strains from natives treated by Bayer 205.
" 13. Viability in human blood, immune and non-immune, of gland trypanosomes of tsetse (Rodhain's tube).
" 14. Does *T. gambiense* transmitted by *G. morsitans* alter at all? Appearance of posterior-nuclear forms, etc.
" 15. All strains isolated from man to be inoculated into guinea-pigs to compare the reaction of these strains in animals.
" 16. Transmission of arsenic-fast strains by tsetse.
" 17. Precipitin test or some equivalent examination."

Epidemiological Studies.

" 1. Acquisition of evidence bearing on the empirical and practical assumption that, in *palpalis* areas at any rate, man is by far the most important, if not the only, reservoir of human trypanosomes.
" 2. Investigation of the ' survival foci of infection,' from which the human trypanosomes of *palpalis* areas spread when the necessary favourable conditions arise: fly density, female percentage, breadth of contact in such foci; cyclical infectivity of fly; part played by animals in maintenance of infection. Special attention in examination of ' auto-recovery ' or ' cure ' resulting from treatment to see if the cerebro-spinal fluid affords evidence of continued though suspended infection.
" 3. Careful search, in the Budama area, for evidence of alternative vector, such as *Glossinae* (other than *G. palpalis*) mosquitoes, *Haematopota*, tabanids, or other biters, intramural or extramural. Possibility of direct passage from man to man during any of the ordinary activities of daily life, i.e., coitus, native ceremonial (scarification, etc). Evidence of seasonal variations in spread of infection from man to man, with reference to seasonal prevalence of vector.
" 4. Careful study of history of each case discovered and record of severity of symptoms; condition of cerebro-spinal fluid; movements leading up to present residence and occupation; personal knowledge of the disease, past and present; probable date of onset of symptoms, and how the disease progressed and developed; subjective symptoms.
" 5. Special endeavour to determine lines of movement of population impinging on infected areas, whether empty or occupied, and search for factors which instigate and direct such movements.
" 6. Careful epidemiological survey of Majanji, Busoga coast and Mpologoma infected areas; mapping out of all cases of trypanosomiasis in the populations recently surveyed by the I.C. Eastern Province.
" 7. Survey of inhabited fly areas with a view to ascertaining ' limits of safety ' for a community in contact with tsetse species.
" 8. Search for evidence that man can be infected by cyclically infected bush-fly in either *palpalis* or game-tsetse areas.
" 9. Continuation of the ' block system ' and ' fisherman experiment ' as an undertaking of high scientific value with a direct bearing on the problem of survival and spread of human trypanosomiasis.
" 10. Effect of drugs.
" 11. The above programme applies more especially to investigations in *palpalis* areas."

The rest of the report consists of the following seven papers :—

2. Report on my visit to the Kavirondo Coast (F. K. Kleine). pp. 17–22.

The object of this journey was to visit a chronic focus of sleeping sickness caused by *T. gambiense* with a view to ascertaining whether

there were any indications of immunity amongst the natives and also whether, and to what extent, the biology of the *T. gambiense* strains in that district differed from the biology of the *T. gambiense* strains in Tanganyika. It was found that at the present time there is no epidemic of sleeping sickness on the southern shore of the Gulf of Kavirondo, and Kleine believes that this is due to the small percentage of infected flies and not to the immunity of the population. Attention is drawn to the fact that, so far as is known, the only morphological difference between *T. gambiense* and *T. rhodesiense* is that the former shows no posterior-nuclear forms in the blood of guineapigs and rats. With a view to testing the reliability of this criterion, 16 different strains of human trypanosomes were injected into 21 guineapigs; in only 4 of the strains was a positive result obtained. The blood of the infected guineapigs was subjected to a prolonged search, and after a time "many very fine posterior-nuclear forms" were found. These forms were first found in the guineapigs (2nd passage) infected from a young native in the initial stage of the disease, who had only left Homa Point to go and buy food at Kisumu. He had never been into *G. morsitans* or *G. swynnertoni* areas, but had always lived on the shore of Lake Victoria.

The posterior-nuclear forms were also found in trypanosomes originating from another native in the second stage of the disease, who had never left his native peninsula.

3. Experiments on the cyclical transmission by *Glossina palpalis* of arsenic-fast strains of polymorphic trypanosomes (H. L. Duke). pp. 23–33.

The trypanosome used in this work was isolated in February, 1924 [not September, 1925, as misprinted in the Report] from a situtunga antelope shot on Damba Island. At the time of its recovery from the antelope its general reactions resembled those of *T. brucei*. This strain possessed the advantage of being easily demonstrable in the peripheral blood of monkeys, so that the effects of the arsenic could be easily observed. The drug used was atoxyl.

The technique followed in this enquiry consisted in applying boxes of clean laboratory-bred *G. palpalis* to monkeys carrying the arsenic-fast trypanosomes. After one or two feeds on the infecting animal, the flies were starved for 24 hours, and then fed every other day on fowls for some thirty days, and finally on clean monkeys until the expiration of the experiment. When the clean monkeys became infected they were tested with appropriate doses of atoxyl to see how the cyclically transmitted trypanosome responded to the drug. These experiments were carried on for some seven months to the third generation and were then terminated owing to pressure of other work. Details of the work are set forth in four tables. The first deals with the original monkeys subjected to treatment with atoxyl in order to produce the arsenic-resistant strains. The second deals with the monkeys infected by the first series of fly experiments fed on, and infected by, two of the animals mentioned in the first table. The third gives the histories of the monkeys of the second and third series of fly experiments; these monkeys represent second and third generations of transmissions. The fourth shows the details of the actual fly experiments.

Unfortunately, owing to the shortness of monkeys, no control inoculations were made to ascertain the susceptibility to arsenic possessed by the

trypanosome at the time the experiments were commenced, but Professor KLEINE, who treated the first three monkeys used in the experiment, concluded that the *dosis efficax* for the strain in question was about 0·01 gm. of atoxyl per kilogram of body weight ; and it was upon this basis that Duke continued the treatment. It is seen from the table that the behaviour of the trypanosomes under gradually increasing doses of atoxyl was consistent with the assumption that the parasites were becoming increasingly arsenic-fast.

After completing a series of transmission experiments, under the impression that the *dosis efficax* for the strain was about 0·01 gm. per kilogram, before assembling the material for publication Duke decided to carry out some control inoculations of atoxyl into untreated monkeys. The results were unexpected, as in three monkeys three times the *dosis efficax* failed to sterilize the animals : all relapsed as did also two other animals treated respectively with the *dosis efficax* and twice this amount, even though treatment was given on the first day after parasites appeared in the blood.

After considering various possible explanations of this, the author reaches the following conclusions :—

1. That, even if the direct-transmission series of the Damba trypanosome gradually developed during the last 5 or 6 passages an increased resistance to atoxyl, the estimated *dosis efficax* at the 30th passage still caused complete disappearance of trypanosomes from the peripheral blood for at least 10 days.

2. That, at the time of their selection for treatment, the first 3 monkeys which resisted three times the *dosis efficax* were all in a fairly advanced stage of the disease and showed signs of involvement of the nervous system.

3. That, judging by the results of the examination of the cerebro-spinal fluid, the virulence of the Damba trypanosome for monkeys had increased between the 20th and the 26th to 28th passages.

Returning to the actual fly-transmission experiments two very important facts emerge. Firstly, in the majority of the monkeys of the 1st, 2nd and 3rd generation of fly transmissions, the administration of the test dose of atoxyl hardly affected the presence of trypanosomes in the peripheral blood ; and secondly that the only monkeys used to infect the original series of fly experiments had long been under observation, and their trypanosomes always behave in a manner consistent with the conclusion that neither strain possess any unusual resistance to arsenic prior to the course of treatment with atoxyl.

The conclusions are as follows :—

" 1. That the acquired character of resistance of a trypanosome to arsenic persists after cyclical passage of the strain through tsetse.

" 2. That the degree of arsenic resistance possessed by a strain is not diminished by cylical passage of the strain through *Glossinae*.

" 3. That the character survives, at any rate, to the third generation of cyclical passages.

" The importance of these results is obvious when we remember the wide use of atoxyl as a prophylactic in human trypanosomiasis and, also, the significant fact that a strain resistant to atoxyl may also possess resistance to other drugs, such as antimony, etc.

" It is thus imperative to repeat these experiments with *T. gambiense* freshly isolated from men, and this will be done as soon as opportunity allows."

[The problem which Duke has set himself to solve appears to the reviewer to be one of fundamental importance. Without in any way

venturing to criticize the work, which is obviously of extraordinary difficulty, the reviewer feels compelled to confess that a very careful and critical examination of the tables in which the data are summarized has left him still in some doubt whether the experimental results are sufficiently clear to enable him to accept, without any reasonable doubt, the fundamental conclusion that the acquired character of arsenic resistance persisted after the cyclical passage of the trypanosome through tsetse. Doubtless, Dr. Duke is continuing his investigations on this very important and difficult question. Possibly, the investigation of the transmission of other acquired characters, such as the artificial virulence to rats or mice of trypanosomes like *T. gambiense* or *T. congolense*, which have been maintained by direct passage through these animals, might prove profitable ; or the possibility of transmitting through Glossina the character of exalted virulence of *T. vivax* for rabbits induced artificially by the method described by the reviewer and BLACKLOCK many years ago. Difficult as this problem is, it is to be hoped it will shortly be solved beyond any doubt, as the question is one of far-reaching importance.]

4. Experiments on the value of "Bayer 205" as a prophylactic against trypanosomes developing in *Glossina palpalis* (H. L. DUKE). pp. 35–39.

The experiments described in this paper were devised to ascertain whether the presence of " Bayer 205 " in the blood imbibed by tsetse has any inhibitory effect on the development of trypanosomes taken up by the fly subsequent to the meal of " Bayer " containing blood.

The conclusions are as follow :—

" 1. The imbibition* by flies of the blood of an animal, from 48 to 408 hours after it had been treated with Bayer 205, does not inhibit the cyclical development in the fly of trypanosomes taken up by the insect 24 hours after its feed on the ' Bayer ' treated animal.

" 2. A dose of 0·023 gramme Bayer 205 per kilogram body weight in a monkey protects the animal against infection by cyclically infected flies for a period of not more than two months."

5. Epidemiological enquiry into Sleeping-Sickness in the Budama District and the Kavirondo Country (L. VAN HOOF). pp. 41–103.

The author's investigations were limited to the Budama and neighbouring districts, north of Lake Victoria, which are recognized as endemic areas for *T. gambiense* and *Glossina palpalis*. The principal questions investigated were the nature of the reservoir of the virus, the methods by which the trypanosome is transmitted, and all the geographical, biological, economic and other conditions which might contribute to the spread of the disease or to its maintenance in an endemic form. Enquiry is not yet at an end and the present report is necessarily of a preliminary nature.

The following summary and conclusions are given :—

" The epidemiological enquiry covered the districts of Budama and the neighbouring infected areas of Bugweri, Busoga, and Kavirondo, and involved the examination of more than 45,000 natives. At the same time, it has only dealt with one special aspect of the question—its aspect in the zone investigated—and it is only by comparison with endemic or epidemic areas that have *G. palpalis* and *G. morsitans* in varying biological conditions

* Inhibition is the word printed.

that we can generalise and establish the rules which govern the continuance of an endemic or the expansion of an epidemic. I do not in any case consider that my enquiry is complete, and I hope to make another visit when I can perfect my existing information, particularly as to the subsequent history of the cases diagnosed and treated, and the biological conditions of the country when climatic conditions are different.

" The following conclusions therefore apply only to the limited field of my observations, and at the same time constitute a programme for further research in other endemic areas.

" 1. There is nothing to suggest that there is any other reservoir of virus than man.

" 2. The continuance of the endemic is closely bound up with the existence of glossinae. The ratio between the sexes of the flies, and their number, seem to have less importance in connection with the continuance of the endemic than other factors, such as the occupations of the natives. The limit of security for the natives cannot be calculated on the basis of figures representing a minimum of contact between man and fly ; it consists in complete separation of these hosts from the trypanosome. Although there is no conclusive evidence, it seems more probable that the trypanosome is transmitted by glossinae infected cyclically than that it is transmitted mechanically, for, in the latter case, we should expect at least limited epidemic foci to be formed.

" 3. It has been found that the degree of gravity in cases of trypanosomiasis varies very considerably. The most serious cases have developed rapidly and could not be arrested ; specific treatment proved useless. Less serious cases have been cured by very small doses of specific remedies ; one of them, indeed, is at least stationary without any treatment at all. The examination of the cerebro-spinal fluid is the best criterion, and is indispensable in judging of the treatment required or the degree of cure or improvement obtained. These differences in the gravity of the disease are due to variations in the virulence of the trypanosome, and not to individual characteristics in the patient which could be explained as immunity or tolerance. The latter, if it does exist in a small degree, invariably fails as soon as the virulence of the trypanosome increases.

" 4. There is no reason to suppose that there is any other carrier of the trypanosome than the glossina.

" 5. The history of the disease as well as my detailed observations show that the spread of sleeping-sickness is favoured by all the circumstances—occupation, famine, migration, etc.—which have caused removals of population, and there is reason to believe that the virus becomes weakened in an endemic area if no new elements—trypanosomes, flies, or men—are introduced.

" 6. In judging of the therapeutic value of a treatment, it is essential to ascertain the virulence of the trypanosome, or at least its relative virulence ; the above observations illustrate the immense difference in sensitiveness to arsenical medicaments between two endemic areas, and between different viruses in one area."

6. On the practical diagnosis of Sleeping-Sickness (L. VAN HOOF). pp. 105–116.

The author quotes BRODEN'S (1920) conclusions, which are as follows :—

" 1. The easiest and most reliable method of diagnosing sleeping-sickness consists in puncturing the enlarged cervical lymphatic glands and immediately making a microscopic examination of the lymph ; this method yielded positive results in 87·7 per cent. of cases.

" 2. The examination of 10 c.c. of centrifuged blood is an excellent method of diagnosis ; it is essential in all cases where hypertrophy of the

glands has not yet developed or has already disappeared ; we had to use it because gland examination was inadequate in 7·7 per cent. of our cases.

" 3. Spinal puncture is of less use in diagnosis proper ; it enabled us to detect trypanosomiasis in 4·5 per cent. of cases ; it is necessary when we wish to ascertain the stage of infection and to institute a judicious treatment."

Broden obtained 61·3 per cent. of positive results by examination of fresh coverslip preparations of blood in a small batch of favourable cases, but Rodhain (1923) obtained only 40 per cent. of positive results by this method for endemic areas in the Belgian Congo, and 50 per cent. of positive results by the examination of stained thick drop preparations. Examination of the centrifuged blood gave, according to Broden, 80·7 per cent. of positive results. Van Hoof writes that diagnosis by simple palpation of the enlarged glands is a method for which there is some excuse when carried out in a hostile country on insubordinate natives, but elsewhere it has been largely criticized, and has given rise to errors that cannot be entirely ignored. In a table the author gives the results of examining 28 cases by the various methods from an endemic zone. Of these cases, 18 were classified as suspect on their clinical symptoms alone, 15 were suspect owing to the size, number, and consistency of the glands, and 15 proved to be positive by the detection of trypanosomes in the lymph. Examination of fresh coverslip preparations gave only two positive results. In thick stained drops trypanosomes were found 8 times. Triple centrifuging of the blood proved by far the most reliable method and was positive in 23 cases. In 24 instances the cytological changes of the cerebro-spinal fluid were significant.

The author compares these results with those obtained by Broden and finds that his own observations were made on a much higher proportion of advanced cases. The author's preference is for gland puncture followed, if necessary, by centrifuging of blood.

Cytological deterioration of the cerebro-spinal fluid plays an important part in the diagnosis and prognosis of trypanosomiasis, because we are concerned with endemic infections in which the great majority of cases are chronic. The cellular elements which are abnormal either in number or nature are small lymphocytes, large mononuclears, or medium lymphocytes, muriform cells, eosinophil myelocytes, and sometimes large vacuolated elements which might be taken for macrophages. Trypanosomes appear at times, but their number varies widely, and sometimes it may be impossible to detect them even in very advanced cases. The degree of cytological deterioration depends on two factors, the age of the disease and the virulence of the germ.

Details are given concerning the condition of the spinal fluid in a series of 14 monkeys infected with the trypanosome of the Damba antelope, which entirely confirm the conclusions of Broden and the author.

T. gambiense in experimental animals produces deteriorations of the spinal fluid which are proportionate to the length of the period of infection and the virulence of the parasite. Illustrations of this are shown in a table from which it will be seen that large mononuclears and muriform cells do not appear unless small lymphocytes are already present in considerable numbers.

The following are the conclusions :—

" 1. In areas with a low degree of endemicity, the diagnosis of sleeping-sickness is rendered more difficult by the frequency of advanced or chronic cases.

" 2. Microscopic examination of the glandular lymph is the first process to apply to every suspect. The most reliable method is triple centrifuging of the blood, which should be used when gland-puncture is negative or cannot be carried out. Any doubt will be removed by analysis of the cerebro-spinal fluid if the first two methods are negative.

" 3. Examination of blood in a thick stained drop is a resource not without value, which may be of service in the case of maniacs and children, or where triple centrifuging of the blood is impossible.

" 4. Even in the absence of trypanosomes, examination with special reference to cytological changes of the cerebro-spinal fluid is the most valuable method of diagnosis, particularly for very advanced cases in which these changes attain a degree and a form not found in other diseases.

" As a ground for prognosis, it is so valuable as to be indispensable at the beginning and end of a well-conducted treatment.

" 5. The degree of change in the cerebro-spinal fluid serves as a measure of the virulence of the trypanosome and the stage reached by the disease."

7. The posterior-nuclear form (G. LAVIER). pp. 117–142.

After referring briefly to a discovery of the posterior-nuclear form and to the various trypanosomes from which it has been described, the author enquires whether it is really true that no individual of the species *T. gambiense* has ever been found with rearward displacement of the nucleus.

He remarks that in 1910, when STEPHENS and FANTHAM first made their announcement of the posterior-nuclear forms in *T. rhodesiense*, although the morphology of *T. gambiense* had already been extensively studied, nothing had yet occurred to call attention to the posterior-nuclear forms. It is therefore not impossible that observers had already met with a few individuals with a displaced nucleus, but had attached no importance to the phenomenon. When later it was desired to verify the non-existence of such forms recourse was had to strains of *T. gambiense*, which had already been maintained for years in the laboratory. Lavier considers that there is no doubt that if it had been possible to review the old preparations made when the first cases studied, or animals inoculated, reached Europe, posterior-nuclear forms would have been found without difficulty. After searching the literature he considers that two plates at least are worth close examination, and he reproduces figures from each, which show, in his opinion, some evidence of posterior displacement of the nucleus in *T. gambiense*. The first are from a plate made by HINDLE and the second from one made by BRUCE.

Up to the present, 11 strains taken from cases infected in the *G. palpalis* areas near Lake Victoria have been isolated by the Commission and preserved in the Entebbe Laboratory. None of them has yet given a lasting infection to the rat ; three of them have also been unable to infect the guineapig. One infected a guineapig, but was unfortunately lost. In all the other 7 strains, however, the author has found posterior-nuclear forms in the guineapig. He emphasizes the point that these forms are infinitely rarer than in *T. rhodesiense*. Details regarding the 7 strains are given, as also are figures of some of the posterior-nuclear forms encountered. These 7 strains on account of their origin and of the character of the infection they produced in man and animals must undoubtedly be regarded as *T. gambiense*. The author deals in some detail with the mechanism of the production of the posterior-nuclear forms. The mode of division of the long form is well known. The kinetoplast divides first and one of the daughter

kinetoplasts moves forwards, the new flagellum being formed from it almost at once ; the nucleus then divides and the two daughter nuclei are situated one behind the other, the distance between their centres being approximately the same as that between the two kinetoplasts. Thus, in the two new individuals resulting from the division, the nuclei will be approximately in the same position in each.

Opinions are widely divided regarding the possibility of the division of the short form, but in the case of *T. rhodesiense* this possibility has never been questioned. Lavier states, however, there can be no doubt that when placed in favourable conditions the short form can divide fairly plentifully in *T. brucei* as also in *T. gambiense* and *T. rhodesiense*. The first organ to divide is the nucleus and some time later the second flagellum appears ; this is followed almost immediately by the division of the kinetoplast, the two portions of which remain on the same level ; so that at this stage there are two nuclei one behind the other, two flagella, and two kinetoplasts on the same level. The distance between the nucleus and the kinetoplast is consequently very unequal in the two individuals, and thus when division is complete we have two short forms in one of which the nucleus is much nearer the posterior extremity than in the other.

8. On the existence of *T. vivax* in man (G. Lavier). pp. 143–147.

After referring to the fact that in 1917 Macfie reported the discovery in a native of the Gold Coast of a monomorphic trypanosome resembling *T. vivax*, as seen in stained slides, the author passes to his own observations on the trypanosomes in the blood of a case of sleeping sickness which he studied at Entebbe. From this study he concludes that *T. gambiense* is capable of presenting itself in man with the appearance of *T. vivax*, and consequently, until the latter species has been recognized in man beyond question, after a full examination involving in particular observation in the natural state and inoculation into animals, it must be struck off the list of human parasites.

W. Yorke.

Carpenter (G. D. Hale). **Appendix to Report* of Senior Medical Officer, Sleeping Sickness, for 1925. A Statistical Enquiry into the Records of Fishing Permits issued on Lake Victoria since the Middle of 1922.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December*, 1925. pp. 92–95.

The investigations were made in August and October, 1925, so that the records for that year are not applied. Over 20,000 permits were examined and tabulated. The system of control of fishing on Lake Victoria was devised in 1922 by the Bacteriologist. A detailed account of the system is given and of the care taken to prevent fraud. The records are assembled in a series of tables, the first of which gives for each fishing area and for each half year the number of permits issued, divided into two classes, according to whether the glands of the applicants were only slightly or much enlarged. The following classification was adopted for the signs to be entered on the permits :—glands

* With reference to the main part of Dr. Carpenter's Report, noticed in this *Bulletin* on p. 561–2, Dr. Carpenter points out that the word *Madi* on line 25 of page 562 should read *Aringa* (West Nile).

impalpable ; +glands palpable, not easily punctured ; ++ glands large, hard ; +++glands large, soft, pulpy ; and the appropriate record was made for the axillary and cervical glands of each side of the body separately.

The second table shows for each half year the numbers of original and renewed permits issued. Rather more than 10,548 persons have received fishing permits since the middle of 1922.

The number of individuals who steadily pursued their craft for period after period diminished greatly after the first renewal, until only 254 applied for 5th renewals in the first half of 1925.

Table III shows the percentage of enlarged glands (++ or +++) in each area for each half year. Slightly enlarged glands are not included owing to differences of opinion as to whether certain glands should be classed as normal or slightly enlarged. The value of this table is based on the presumption that in any area contact with *palpalis* would, if the fly were infected with the human strain of trypanosome, cause a certain increase in the size of the lymphatic glands and that the fisherman in such an area would show a definite increase in the percentage of enlarged glands for a period following the date when human infection was sufficiently frequent to be so revealed. The figures suggest that such human infection has not occurred. For instance, in the Entebbe and Sese areas medical examinations for the 4th renewal (i.e., after the fisherman had been in contact with *palpalis* for four half years) in the second half of 1924 showed that there was no increase in the percentage of enlarged glands, and in the Entebbe area even six half years had produced no increase among the 25 men who applied for a sixth renewal. In addition, it may be stated that except in the Mjanji area microscopic examination of enlarged glands has not showed trypanosomes in any case.

W. Y.

[The figures given do not seem to warrant any conclusion, even a tentative one. In the attempt to get an indication of infection for each district the data have been split up into so many subdivisions that percentages are calculated on small numbers. And even if these percentages correctly represented the occurrence of enlarged glands among those re-examined there is no certainty that they in any way represent the incidence of enlarged glands among those exposed ; for less than half of those originally examined appeared for even the first re-examination and the numbers appearing for subsequent re-examination fell off very rapidly.

Perhaps, if the districts were lumped together, and percentages of ++ and +++ were calculated on total original examinations, total first renewal, total second renewal and so on, some tentative idea of altered incidence of glandular enlargement might be obtained. But is glandular enlargement a sufficiently certain criterion of sleeping sickness infection to make all this figuring worth while ?]

J. F. C. H.

Tanganyika Territory. **A Report on Human Trypanosomiasis in Tanganyika Territory for the Year ending 31st December, 1926** by Dr. G. Maclean, Sleeping Sickness Officer.—34 typed pp. [Received from the Colonial Office 20th Apr., 1927.]

There are in Tanganyika Territory five separate areas where human trypanosomiasis is known to exist, and up to the present infection has

not been traced from any one of these areas to another. These areas are : (*a*) Maswa-Ikoma ; (*b*) Tanganyika Lake Shore Area ; (*c*) Ufipa-Tabora Area ; (*d*) Liwale Area ; and (*e*) Rovuma Area. In all the areas, except the Tanganyika Lake Shore Area, the trypanosome is *T. rhodesiense*. The number of cases and deaths recorded for the years 1925 and 1926 respectively is shown in a table.

In a short section dealing with symptomatology, it is noted that the incubation period in one European, whose movements are known, could not have been longer than 27 days. No essential difference was observed in the symptomatology of cases in *G. swynnertoni* areas as compared with those infected in *G. morsitans* areas. In Liwale and Northern Ufipa, there is nothing to suggest that there is any vertebrate host of the parasites other than man. This applies also for the most part to Tabora, though here in a few cases the history of infection is not yet clear. In Southern Ufipa there have been some obscure cases which suggest that there may be foci of infection in certain uninhabited places. In Maswa the situation is obscured by the fishing and hunting habits of natives living in fly-free villages.

The preventive measures adopted consist briefly in sterilizing the peripheral blood of infected cases, reducing the contact between man and tsetse, and controlling the movements of natives in infected areas. Attempts to sterilize the peripheral blood generally go hand in hand with attempts to cure. So far as resources allow all except very advanced cases are now treated, the drugs employed being " Bayer 205," " Fourneau 309," tryparsamide, and tartar emetic.

An account is given of the various measures which are being adopted with a view to reducing contact between man and tsetse in *morsitans* and *palpalis* areas, respectively ; and also of those in force for controlling the movements of natives. A summary is next given of the various methods of treatment in vogue. The drugs used almost exclusively are those mentioned above. The author believes that if " Bayer 205 " is given sufficiently early in the disease in doses of 1 to 1·2 gm. over a period of 4 to 5 weeks it is probable that the majority of the cases will recover. In late cases the drug is very disappointing, dramatic improvement and apparent recovery being followed after a variable period (it may exceed a year) by relapse and death. In a third class of case the drug may be of more than usual value, i.e., the " ambulant " case with high natural resistance to the disease. The results obtained with " Fourneau 309 " are similar. Tryparsamide alone has given good results in a few cases, but more frequently it fails to arrest the disease even when as much as 30 gm. is given.

Bayer and tryparsamide combined is a form of treatment which requires to be spread over a period from 4 to 6 months, and is consequently extremely irksome to the patient. Where a full course has been given, results on the whole are good, but hardly better than might have been expected from Bayer alone. The statement that a previous course of " Bayer 205 " renders tryparsamide more likely to produce optic atrophy lacks absolute proof. Relapse cases are treated in the same way as late cases, but they usually react badly. The *gambiense* cases are best treated with tryparsamide.

The next portion of the report is concerned with a more detailed discussion of the sleeping sickness situation in the respective areas. In an appendix the results of treating a considerable series of patients with " Bayer 205 " and tryparsamide, respectively, are set forth in a series of tables. The appendix also contains a note on the result of

treating a case of sleeping sickness by intrathecal injection of "Fourneau 309" in oil. The patient had reacted unfavourably both to Bayer and tryparsamide and was blind, and extremely emaciated and weak. The first injection, consisting of 1·2 grains of the drug, apparently produced no ill affects, but the second injection, consisting of double the dose, given about ten days later, apparently killed the patient within a few hours.

W. Y.

Ledentu (G.) & Vaucel (M.). Répartition actuelle de la trypanosomiase humaine en Afrique Équatoriale Française. [**Present Distribution of Human Trypanosomiasis in French Equatorial Africa.**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 511–523. With 1 map. [1 ref.]

Since 1925 the combat against sleeping sickness in French equatorial Africa has entered upon a new phase. The simple medical tour with a minimum of atoxylization has given place to a methodical inspection of the population village by village and subdivision by subdivision. The medicinal treatment is now more perfect and consists of six massive injections of atoxyl. The aim of the present communication is to give a brief summary of the results of these new measures. The report of Blanchard and Laigret (1924) serves as a base from which to appreciate the results of the modified measures of the last two years [this *Bulletin*, Vol. 21, p, 752].

A summary is given of the present state of affairs in the five following regions :—

(1) Gabon.—*The estuary of Gabon-Como.* The whole of this region was revisited in 1925. The index of morbidity was 2·8 per cent., varying in different places from 1·09 to 4·03 per cent. In 1926 the only subdivision re-examined was Owendo and here the disease seemed to have progressed, the morbidity having risen from 2·14 per cent. to 4·32 per cent.

Bas-Ogooué.—This region has not been re-examined since 1921–1923.

Moyen-Ogooué.—Here the disease has assumed the form of a severe epidemic which fortunately prophylactic measures are now arresting. At Booué and its environments the percentage of infected, which was in 1922 about 1·2, had risen to 25 in 1925. It was atoxylized and re-visited in 1926, when the index of new infections was found to be 3 per cent. In the lower reaches of the Ivindo, the index of morbidity reaches the disquieting figure of 57·6 per cent.

Haut-Ogooué.—The focus at Lastourville-Franceville is still in a state of full activity, about 43 per cent. of the population on the banks of the Ogooué near Lastourville being infected in 1925. Here also the prophylactic measures give good hope, the index of morbidity at Lastourville having fallen from 39·6 in 1925 to 12·1 in 1926 and the new infections from 3·2 per cent. to 1·5.

At the confluence of the Sébé and Ogooué the index has fallen from 74 to 53·1 per cent. with 2·6 per cent. of new infections ; but certain villages still exhibit enormous numbers of infected, varying from 77·5 to even 96·6 per cent.

The state of affairs in the other four sectors, viz (2) Djoué-Loudima ; (3) the Congo and its tributaries ; (4) the Oubangui, and (5) the valley of the Chari, is summarized in a similar manner. [The figures given

are very striking and should be consulted by those interested in the original, as it is almost impossible to summarize briefly a condensed paper of this nature].

In conclusion, the authors write that the results given in this paper are the first which have been put together since the new method of prophylactic treatment recommended by BLANCHARD and LAIGRET, viz., 6 injections of atoxyl at 10 day intervals, together with systematic examination of the whole population, have been adopted. Taken as a whole the first results are most encouraging. If in certain places the disease seems resistant and the endemic has even progressed, the disappearance of the epidemic foci affords great consolation. The combat has been waged with evident success in the Brazzaville region and in the Djoué-Loudima sector, which has been the object of particular attention owing to the assembling of workers for the construction of the Congo-Ocean railway. The disquieting foci of Moukagni and Mossendjo have been practically extinguished and high percentages of infections are now only found in those subdivisions which have not yet had the benefit of massive atoxylization. Where a comparable effort has been made similar results have been obtained in the sectors of Oubangui (e.g. Bambari) and of Chari (e.g. Bouca-Marali), but where lack of personnel has not permitted of proper control of treatment progress has been unsatisfactory and the menace persists.

W. Y.

MACKAY (A.G.). **Report on the Incidence of Sleeping Sickness in the Lawra District, October, 1924.**—*Gold Coast Rep. Med. & San. Dept. for Period Apr. 1925—Mar. 1926.* Appendix E. pp. 61–71.

In view of the fact that 8 cases of sleeping sickness had been reported from Lawra during the twelve months ending July, 1924, and that an epidemic of sleeping sickness is believed to have devastated the district some forty years ago, it was considered important to ascertain whether the factors favourable to an epidemic still existed. The author visited the district and spent from September 30th to October 11th, 1924, examining the inhabitants of the various villages. The area from which cases of sleeping sickness are recorded extends from Baghari, 7 miles north west of Lawra, to Metaw, 3 miles due south. The area is probably 50 or 60 square miles and comprises Lawra itself and some 19 small villages. The number of cases of sleeping sickness which occurred in this area during the preceding 12 months was 29, and 6 of these were still alive and seen by the author. Details of the distribution of these 29 cases are given. Tsetse were found along the course of the Black Volta and its tributary, the Kamba, and probably also of its other tributary, the Konyonkwon. The banks of the Kamba river appear to offer ideal breeding grounds for *G. palpalis* and *G. tachinoides*. Although only these tsetse were seen by MacKay, it is stated that *G. morsitans* is known to exist in the district.

Some account is given of the distribution of Glossina. It is believed that the infection is contracted at the ferries and fords of the Black Volta, but it is also possible that it may be introduced from the French country beyond.

A brief clinical account is given of the 29 cases with some remarks on special symptoms and treatment. A number of recommendations for dealing with the situation are also made.

W. Y.

Proceedings of the Royal Society of Medicine. 1927. Apr. Vol. 20. No. 6. pp. 971–985 (Sect. Comp. Med. & Sect. of Trop. Dis. & Parasit. pp. 95–109) [2 refs.]. **Special Discussion on Trypanosomiasis in Man and Animals.** [Andrews (W. H.) Manson-Bahr (Philip). Thomson (J. Gordon), Neame (Humphrey), Harvey (D.) & Moore (John).]

This discussion is of a general nature and contains nothing new. Manson-Bahr confines himself to the treatment of trypanosomiasis in man and gives a résumé of the results obtained by the use of " Bayer 205 " and tryparsamide. Thomson concerns himself with the question of the polymorphic trypanosomes in game and man in Africa and summarizes the views put forward by Duke, Thomson and Robertson, Taute, the reviewer, and others. Neame refers to keratitis in infected cattle, dogs, and man ; he states that it is sometimes accompanied by iritis and cyclitis. In severe cases necrosis of part of the cornea may occur, with a subsequent scar formation and very serious impairment of vision. Harvey stated that whilst working with Bruce in Nyasaland they had an opportunity of re-examining some of the original slides made by Bruce in Zululand and were able to confirm what has since been frequently surmised, viz. that Bruce had been working with three different species of trypanosomes, *T. congolense*, *T. vivax* and *T. brucei*. On comparing the Nyasaland *T. brucei* with that from Zululand it was noted that there was some difference in morphology. The latter strain showed a more exaggerated polymorphism and the posterior-nuclear forms were more numerous. These statements refer to the examination of films prepared from the blood of infected white rats. After passage through Nyasaland tsetse fly, which differs from the Zululand tsetse, these characteristics remain unchanged. Harvey added that whilst in Nyasaland they came across a monomorphic strain of *T. brucei* to which the name " the trypanosome of the naturally infected dog " was given. After many unsuccessful attempts they succeeded in infecting flies with this strain, in the hope that passage through the fly might cause it to revert to the polymorphic form ; but this proved not to be the case, as the trypanosome still retained its monomorphic form and low virulence for animals. Harvey considers that it may have been a similar strain which reached this country originally. This monomorphic strain might be the survivor of a mixed infection. It is unlikely that the change to monomorphic form took place by repeated inoculations, as it was already monomorphic when originally examined by Plimmer and Bradford.

Referring to the alteration in virulence of trypanosomes by passage through an alternative host, Harvey recalls that *T. simiae*, which is remarkably virulent for monkeys and young domestic pigs, lost this virulence after passage through the goat.

W. Y.

Ledentu (G.) & Vaucel (M.). La formol-gélification dans la trypanosomiase humaine. [**The Formol-Gel Reaction in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 601–607. [Pasteur Inst., Brazzaville.]

The authors have applied the formol-gel reaction to the serum of patients in various stages of sleeping sickness. They consider that

as the reaction is positive in syphilis and in a certain number of other infections it has from the qualitative point of view little interest to those practising in the tropics. But when the reaction rate is taken into consideration it gives interesting results in human trypanosomiasis.

In non-treated patients the reaction is very rapid (about 7 min.) in the first stage of the disease ; it is a little slower in the second stage, about 25 mins. in those whose spinal fluid contains trypanosomes, and 2 hours in those whose spinal fluid is changed but does not contain trypanosomes.

Treatment retards the reaction in the vast majority of cases and sometimes makes it negative, but its behaviour has no prognostic significance.

W. Y.

Levaditi (C.) & Klarenbeek (A.). Prophylaxie des trypanosomiases par ingestion du Moranyl (309 Fourneau ou 205 Bayer). [**Moranyl by Mouth in the Prevention of Trypanosomiasis.**]—*C. R. Acad. Sci.* 1927. May 16. Vol. 184. No. 20. pp. 1213–1214. [1 ref.]

Prophylaxis in trypanosomiasis by oral administration of chemical compounds is a question of the greatest importance. After having tried without much success many arsenical preparations, the authors have taken up the study of " Fourneau 309," or " Bayer 205," and have obtained in the rabbit certain results They found that when this drug was administered per os it exercised a definite and durable prophylactic action against nagana ; even a single dose of 0·1 gm. of body weight conferred protection for at least 39 days, lasting between 39 and 87 days. Among the 31 animals used only 2 failures were encountered. These were rabbits to which the drug had been given 24 and 48 hours respectively before inoculation. It therefore seems that the intestinal absorption of 309 occurs slowly, but when once the absorption has taken place the active principle persists a long time in the organism. Repeated small doses of the drug are also efficient from the prophylactic point of view.

W. Y.

Bossert. Compte rendu de l'expérimentation du 309 Fourneau dans le secteur de prophylaxie no. 1 (Afrique Equatoriale Française. [**Prophylactic Use of " Fourneau 309 " in French Equatorial Africa.**] —*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 460–464.

In September, 1925, it was decided to ascertain whether " 309 Fourneau " had the same immunizing action against human trypanosomes that it possesses against animal trypanosomes.

A place was chosen which had not been visited for more than a year, but where it was known that for some years the disease had been on the increase and the changes of infection were sufficiently great. On re-investigating the district a marked decrease of the disease was noted, but the proportion becoming infected was still considerable, the annual index of new cases being 11·35. The observation was conducted in 8 villages, 7 being on the road from Bambari to Moroubas and the other on the road from Bambari to Grimari.

The author proceeded on the following plan :—

All the infected were set aside and treated with atoxyl ; those free from infection were divided into two equal groups, the men, women,

and children being in the same proportion in each. The first group served as a control and the individuals of the other group were injected with 309.

In all, 500 persons were injected with doses varying from 0·02 gm. per kilo to 0·04 gm. per kilo. Practically no untoward symptoms resulted. Seven months later the district was revisited, but owing to a mistake recruiting of labourers had taken place and only 267 of the 500 injected were found and 313 of the 503 controls. These were all most carefully examined for trypanosomes ; none of the 267 injected was found to be infected, and 8 of the 313 controls, i.e. 2·5 per cent. Details are given in tables.

In an addendum it is recorded that Dyleff visited the villages again in July, 1926, and found 108 of the injected who were not present at the previous examination in April. None of them was infected.

W. Y.

Strada (L.) & Lopes (A. J.). Notes complémentaires sur le traitement de la trypanose humaine par la Germanine (205 Bayer). [**Further Notes on the Treatment of Human Trypanosomiasis by Germanin.**]—*Ann. Soc. Belge de Méd. Trop.* 1927. July. Vol. 7. No. 1. pp. 1–13. [1 ref.] [Uele Sleeping Sickness Mission, Ango Lazaret.]

Further information is given concerning the 43 advanced cases of sleeping sickness treated during 1923 to 1925 with " Bayer 205." [this *Bulletin*, Vol. 23, p. 423]. In a table the following data are set forth—name of the patient, date of discovery of the illness, summary of the treatment administered, and information regarding the weight of the patient, the condition of the spinal fluid and the presence of trypanosomes, etc. Analysis of this table shows that of the 12 cases which were relatively well when treated, one was apparently cured, the spinal fluid returning to normal and the patient remaining well for a period of six months ; 2 are dead, the condition of the spinal fluid becoming relatively worse ; one has improved with only 10 cells per cmm. of the spinal fluid ; and 8 still have pathological spinal fluid, which in 3 has become much worse.

Of the 31 grave cases, 9 are dead within a period of 3 to 7 months after treatment. One died by hanging, in one the spinal fluid had become practically normal, 3 had remained in *statu quo*, in 9 the lymphocytosis had decreased, and the remaining 8 are definitely worse. In all the patients the examination of the blood for trypanosomes by the triple centrifuging method was invariably negative. It is now proposed to treat those who are alive with tryparsamide.

The following are the conclusions :—

1. In cases of chronic trypanosomiasis with altered spinal fluid Germanin produces a diminution of the lymphocytes, but this is generally transient.
2. In some cases, which are comparatively rare, one observes several months after treatment an improvement of the spinal fluid or this condition has remained stationary.
3. In the greatest number of cases the disease continues to progress slowly to a fatal issue.
4. " Bayer 205," in the authors' opinion, is not an ideal drug for the treatment of trypanosomiasis.

W. Y.

JAMOT & VERNON. Nouvel essai de la tryparsamide dans le traitement des formes avancées de la trypanosomiase humaine. [**New Trial of Tryparsamide in the Treatment of Advanced Trypanosomiasis**]. —*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 689–695.

In this paper, which is based on 100 cases, the authors propose to show

1. The superior curative action of tryparsamide in advanced cases of sleeping sickness.
2. That its use is not incompatible, as certain authors believe, with the previous administration of atoxyl or emetic.
3. That it can be injected without inconvenience subcutaneously.

Among the 300 very advanced cases of sleeping sickness treated at the camp of Ayos (Cameroon), 124 had received, up to the time of writing, six injections of tryparsamide or had died during treatment. Of these 124 cases 19 have died—6 of intercurrent disease, 10 who were in a state of senile cachexia and who were given small doses of the drug, and 3 apparently from the drug. In six cases there was no modification of the meningeal reaction ; and in one case amblyopia developed after the fifth injection.

There were 26 successes out of 38 cases with trypanosomes in the spinal fluid ; at the end of treatment the parasites had disappeared and there was a considerable reduction of the lymphocytes and mononuclear leucocytes.

There were 60 good, or very good, results among patients exhibiting marked signs of nervous disease, and in whom there was an intense meningeal reaction with cells varying from 18 to 864 per cmm.

In all, 77·5 per cent. of results which could be classified as excellent or favourable were obtained.

It is noted that the cytological changes do not always coincide with the clinical results. The lymphocytosis may persist and the patient's general condition be greatly improved or vice versa. The desire of the patients to return to their villages caused the final puncture to be made two days after the last injection. If this could have been delayed it might have shown the drug had the prolonged effect which seems to be characteristic of it. A case is cited where the puncture immediately after treatment showed 21·8 elements, whilst that made 3 months later showed only 5·6.

The authors' observations do not confirm the view that previous treatment with arsenic or antimony renders the cases less favourable for tryparsamide : a number of cases are mentioned in support of this contention and in a table a summary is given of 27 cases in which the amount of atoxyl previously administered is known. These give 95 per cent. of good or excellent results notwithstanding the fact that they had previously had from 2·5 to 28 gm. of atoxyl.

Regarding the duration of the results obtained from tryparsamide reference is made to the observations of VAN HOOF and VAN DEN BRANDEN, of CHESTERMAN, and of MARQUEISSAC. Further information is given concerning two cases treated in the early part of 1924 by MARQUEISSAC and Jamot ; these were alive and well with normal spinal fluid in February of this year. It is concluded that tryparsamide has a curative value which is almost constant, and a powerful and lasting action in cases where the meninges are involved.

The treatment consisted of 10 weekly injections, each of about 4 cgm. per kilo of body weight : the initial doses were based on the

general state of the patient and only exceptionally was more than 3 gm. given for a strong adult. The drug was prepared by a French firm and the solution made at the time of injection; it was given subcutaneously. After various trials it was found that the strength of the solution should be 10 per cent. Such solutions are not more painful than atoxyl and cause no trouble.

W. Y.

Ledentu (G.) & Vaucel (M.). L'acétylarsan dans la trypanosomiase humaine. [**Acetylarsan in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 524–535. [1 ref.]

Whilst in French Equatorial Africa atoxyl remains the clinical remedy for trypanosomiasis in the bush, a number of very successful observations have been made at the Pasteur Institute of Brazzaville with tryparsamide and more recently with "Fourneau 270." In the present paper the authors record the results obtained with acetylarsan and organic derivatives of arsenic—pentavalent as atoxyl—and belonging to the series of phenylarsinic acids as do tryparsamide and "270." The stability of the product in solution, its feeble toxicity, and its lack of neurotropism suggested that it might prove to be one of the best remedies. The test was conducted on 29 patients in different stages of the disease; details of all are given. Of the 22 patients in the first stage of the disease, 2 remained sterilized during an observation of 70 days, 18 relapsed and 2 are dead. Seven patients in the second stages of the disease were treated; of these one was at the commencement of this stage and was recognized as such only by lumbar puncture; the other six were well advanced cases and exhibited clinical signs of invasion of the central nervous system. Details of the seven cases are given. The effect of the drug on the peripheral injection was either nil or transitory. Concerning its effect on the cerebrospinal fluid, it is recorded that in one of two cases showing trypanosomes in the spinal fluid, the drug failed to cause the disappearance of the parasites. The action on the lymphocytosis was feeble and transitory; as was also its influence on the amount of albumose.

It is concluded that the action of acetylarsan on the trypanosomes in the haemo-lymphatic system is prompt, a dose of 0·7 gm. causing the disappearance of parasites from the glands within 8 to 24 hours in the majority of cases and from the peripheral circulation within about 7 hours. The action is, however, quite transient and relapses occur within 18 to 20 days. Its action on the cerebrospinal infection is uncertain and only temporary. The drug is perfectly tolerated and did not give rise to any ocular disturbance.

W. Y.

Bock (Georg). Ueber Toxizität und trypanozide Wirkung von Antimonverbindungen mit 3- bzw. 5 wertigem Antimon (nach Versuchen mit Antimosan). [**The Toxicity and Trypanocidal Action of 3 and 5 Valent Antimony Compounds (Experiments with Antimosan).**]—*Ztschr. f. Hyg. u. Infektionskr.* 1927. Apr. 29. Vol. 107. No. 2. pp. 396–406. [7 refs.]

The following summary is given:—

1. Antimosan is in white mice and rats considerably more toxic in subcutaneous injection than in intraperitoneal administration.

2. By the addition of absorption-preventing colloids (gum arabic, gelatine, agar) the toxicity of the preparation on intraperitoneal administration is raised so as to approach that of subcutaneous injection.

3. Prevention of the otherwise extremely rapid excretion of the drug by ligature of both ureters in rats gave the following results :

(*a*) *On subcutaneous injection* : no increase in toxicity was observed ; possibly even more was tolerated than by the normal animals.

(*b*) *On intraperitoneal injections* : the toxicity of the drug was raised more than four-fold.

These observations render it probable that antimosan must undergo a chemical change in the organism. The view that it becomes oxidized is supported by the following observations.

4. An oxidation product of antimosan (No. 781) which contains antimony in the pentavalent form is but slightly toxic ; on subcutaneous injection at least 5 times as much is tolerated of antimosan ; moreover the ratio of the subcutaneous toxicity to the intraperitoneal toxicity is reversed in comparison with that of antimosan. As in the case of rats with ligatured ureters more is tolerated after subcutaneous than after intraperitoneal administration.

5. The oxidized pentavalent antimosan possesses no noteworthy trypanocidal property ; and similarly it was found that after ligature of the ureters the activity of intraperitoneally injected antimosan in rats infected with trypanosomes is lessened or even destroyed.

These experiments indicate that in the animal organism the very active and not unpoisonous antimosan with trivalent antimony is changed through oxidation into a less active compound containing pentavalent antimony. It is in this form that antimosan is destined to be excreted. Experiments on rats after ligature of the ureters showed that this oxidized compound, in contrast to antimosan, is better tolerated after subcutaneous than after intraperitoneal injection. It cannot be affirmed that a body chemically identical with " 781 " actually is formed in the animal organism ; but that chemical processes take place in a direction which tends to the formation of a non-poisonous oxidized product is, from the above experiments, very probable.

The author believes that in intraperitoneal injection of antimosan a very rapid and complete formation of the less active oxidation product takes place. This cannot, except in high doses, exert a toxic effect, because it is so quickly excreted ; but if the excretion is prevented poisoning is soon manifest. On subcutaneous injection both the formation and the excretion of the inactive oxidation product are slower and quantitatively less complete. The same is seen when antimosan is injected intraperitoneally with the addition of protective colloids. The result is greater toxicity, but a better trypanocidal action. Prevention of the excretion does not lead in this case to greater toxicity, because the oxidation product is better tolerated by the subcutaneous tissue. It must be assumed that both in normal and in ligatured animals on subcutaneous as well as on intraperitoneal injection there are definite oxidation-optima which vary according to the different conditions.

These investigations taken as a whole lead to the conclusion that differences in toxicity and therapeutic activity of the antimony compounds is dependent, as in the case of the arsenicals, on the action of the oxidation and reduction processes which occur in the living organism. The method of administration of the drug is not of negligible significance ; not only is absorption to be considered, but also the biological activity of the tissue into which the drug is introduced. W. Y.

PAPAMARKU (P.). Versuche ueber die Wirkung chemotherapeutischer Stoffe (Salvarsan, Trypaflavin und Antimonverbindungen) auf Spirochäten und Trypanosomen in vitro. [**Experiments on the Action of Chemotherapeutic Substances (Salvarsan, Trypaflavin, and Antimony Compounds) on Spirochaetes and Trypanosomes *in vitro*.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1927. Apr. 29. Vol. 107. No. 2. pp. 407–415. [15 refs.]

The parasitic action of a drug in the animal body is often apparently very different from that of the drug *in vitro*. KOCH and BEHRING worked with a series of substances which exhibit a powerful action *in vitro*, but none *in vivo*, whilst on the contrary trypanrot and atoxyl are of chemotherapeutic value, but exert no action *in vitro*. This has led many authors to the conclusion that the drugs do not act on the parasites but on the host; EHRLICH, however, adhered to the view of a direct action. He explained the difference between the results obtained with atoxyl *in vitro* and *in vivo* on the ground that the drug is reduced in the animal body since the reduction product of atoxyl, viz. para-aminophenylarsenoxide killed trypanosomes *in vitro* in an hour, even when the drug is present only in a dilution of one in one million. In the case of many other drugs, e.g., trypanrot, no corresponding action *in vitro* has been demonstrated.

As regards salvarsan, the general view is held that in the test tube the drug has no action on spirochaetes; consequently the present work, which demonstrates such an action *in vitro* in a very simple manner, is not without interest. In his earlier experiments, commenced in 1919, the author examined the action of various salvarsan preparations, acridin substances and antimony compounds, on the spirochaetes of relapsing fever and on nagana trypanosomes *in vitro*; later, the action of mercury and silver preparations as well as optochin was examined.

In general the spirochaetes were more slowly affected and this is also the case in the animal body. According to SIMIC the trypanosomes take up the unchanged salvarsan, whilst the spirochaetes on the contrary take up only the oxidized drug. According to VOEGTLIN and SMITH the oxide is the really active substance; it kills trypanosomes immediately *in vitro*. If now one accepts with SIMIC that the spirochaetes only take up the drug when it has been oxidized in the body, whilst trypanosomes themselves are able to oxidize it, the apparent difference in action can be explained.

Since the papers of these authors only appeared in 1920 and 1921 after Papamarku had performed his experiments he has not had the opportunity of examining salvarsan oxide.

The author states that by means of the following simple technique he was able to observe trypanosomes and spirochaetes for several days living *in vitro*. An aqueous solution of neosalvarsan was diluted with physiological saline. The spirochaete or trypanosome blood was withdrawn from an infected mouse at the height of the infection and so diluted with inactivated rabbit serum that 3 to 8 parasites were seen to a microscopic field. To 0·2 cc. of the diluted blood in an Uhlenhuth's tube 0·1 cc. of the diluted drug was added, and after being well mixed covered with liquid paraffin. The tubes were kept at room temperature and samples removed from time to time by means of a capillary tube for examination under the dark field mircoscope.

The results of these experiments are set forth in a series of tables.

The following summary is given :—

The view that salvarsan *in vitro* is not directly harmful to spirochaetes is due to insufficiently long observation. When this is extended to from 24 to 48 hours, it is seen that 1 in 1,000,000 dilution kills the organism; nagana trypanosomes are rendered completely motionless by the same strength of solution in two hours. This difference can be explained according to Simic's hypothesis that the trypanosomes take up unchanged salvarsan, whilst the spirochaetes take it up only after it is oxidized.

Trypaflavin and other acridin substances immobilize both spirochaetes and trypanosomes *in vitro*, even in dilutions of more than 1 in a million: here also the spirochaetes are the more slowly influenced.

Tartar emetic and antimony trioxide act *in vitro* as they do *in vivo*, only on trypanosomes; these parasites are definitely influenced by dilutions of 1 in 30 millions, whereas spirochaetes remain motile in the presence of solutions of 1 in three hundred.

W. Y.

Browning (C. H.) & Gulbransen (R.). **Interference Phenomena in the Action of Chemotherapeutic Agents in Trypanosome Infections.** —*Jl. Path. & Bact.* 1927. July. Vol. 30. No. 3. pp. 513–519. [7 refs.] [Univ., & Western Infirmary, Glasgow.]

Reference is made to the fact that in 1922 the authors described under the term "therapeutic interference" an observation that one chemotherapeutic substance (parafuchsin) when present in the tissues of an animal infected with trypanosomes prevented the action of another (trypaflavin or acriflavine). This work was later confirmed and extended by Schnitzer and by Schnitzer and Rosenberg [this *Bulletin*, Vol. 24, p. 571]. On account both of the great biological interest of chemotherapeutic interference and also of its practical importance in connexion with treatment, the authors have investigated the phenomenon further and have confirmed the results of Schnitzer and his co-workers.

The following summary is given :—

"(1) The phenomenon of chemotherapeutic interference was originally described by us in the case of a parafuchsin-resistant strain of trypanosomes which in normal mice was susceptible to the trypanocidal action of trypaflavin, but was insusceptible to this agent when the infected animals were previously treated with parafuchsin.

"(2) The observations of Schnitzer with Rosenberg and Silberstein have been confirmed, viz. (*a*) that the trypanocidal action of other substances, e.g., arsacetin, is also interfered with by parafuchsin, when a subtherapeutic dose of the latter is administered before a therapeutic dose of the former and (*b*) that it is not necessary to conduct the experiment with a parafuchsin-resistant strain of trypanosomes, since the phenomenon may be observed with a normal strain.

"(3) Interference with the therapeutic action of arsacetin is produced by ethylviolet, a triaminotriphenylmethane dye related to parafuchsin, whereas tryparosan, belonging to the same group, and Döbner's violet, a diaminotriphenylmethane compound, have only an uncertain interfering effect. Trypanblue, a tetrazo derivative, shows some interfering action.

"(4) A small dose of parafuchsin interferes with the trypanocidal action of the related substance tryparosan, but does not interfere with a subsequent therapeutic dose of itself.

"(5) As regards the mechanism of interference, the facts indicate that this is due mainly to the direct action of the parafuchsin on the trypanosomes.

" (6) The bearing of the observations on Ehrlich's theory of chemoceptors is discussed. It is concluded that, while they are not incompatible with the theory, there is at present no simple explanation of the results."

W. Y.

CHAGAS (Carlos). Quelques aspects évolutifs du *Trypanosoma cruzi* dans l'insecte transmetteur. [**Developmental Appearances of** *T. cruzi* **in the Insect Transmitter.**]—*C.R. Soc. Biol.* 1927. Aug. 26. Vol. 97. No. 25. pp. 829–832. With 3 text figs. [Oswaldo Cruz Inst., Rio de Janeiro.]

Reference is made to the two forms which *T. cruzi* assumes in the blood of vertebrates. The first form is effilate, the nucleus is long and band-shaped and the blepharoplast is spherical and situated very close to the posterior extremity ; this form is extremely motile. The second is broader, the nucleus more or less oval and the blepharoplast voluminous ; this form is but sluggishly motile. The author believes that the former type represents the male element and the latter the female.

In his earlier works on the subject, Chagas believed that the parasite underwent two distinct methods of evolution in the insect. The first resembled what is seen in cultures, the trypanosomes multiplying by simple division and after passing through various intermediate stages becoming crithidia. In the second, conjugation of the male and female elements seen in the blood of the vertebrate took place, and then, after certain intermediate phases, the last stages, corresponding to the metacyclical forms of BRUMPT, were developed and became lodged in the hind gut of the insect.

Later studies have, however, compelled the author to modify his views. In some experiments he has encountered appearances which he believes represent fecundation between the sexual forms. The recent discovery of delicate trypanosomes, sometimes occurring singly and sometimes in agglomerations, in the mid-gut of Triatoma is of importance. These forms are seen 42 hours after the infecting meal and have nothing to do with the metacyclical forms of BRUMPT. They resemble those which Chagas has described from the salivary glands of the insect. It is supposed that they originate from the multiplication of the forms resulting from the process of conjugation of the male and female elements ; and Chagas believes that it is these forms which are injected when the insect bites. Further experiments on the subject are in progress.

W. Y.

DE FARIA (Gomes) & CRUZ (Oswaldo). Sobre a occurrencia de um estagio intracellular de desenvolvimento do *Trypanosoma cruzi* no *Triatoma megista* (Burm.) (Nota prévia). [**An Intracellular Stage in the Development of** *Trypanosoma cruzi* **in** *Triatoma megista.*]—*Bol. Inst. Brasileiro de Sci.* 1927. June 30. Vol. 3. No. 1. pp. 375–379. With 3 text figs.

By permission of Professor CHAGAS the authors obtained for dissection ten specimens of *Triatoma megista* infected with *Trypanosoma cruzi* in his laboratory.

In the wall of the hind-gut they found within the mucosa cells, apparently in a sort of vacuole, two forms of the flagellate ; some were ovoid or pyriform, 4–6 microns in length, mostly without a flagellum, though some

seemed to possess a rudimentary one ; others of the true trypanosome form. Probably this stage is necessary before the insect can become capable of transmitting the disease.

H. Harold Scott.

Niño (Flavio L.). Formas culturales del *Schizotrypanum cruzi*. [**Cultural Forms of** *Schizotrypanum cruzi*.]—*Bol. Inst. Clín. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 528–530. With 30 figs. on 2 plates.

The author obtained good results by employing defibrinated human blood and 2 cc. to 10 cc. of melted agar. From infected guineapigs blood was taken by heart-puncture, mixed with 2 per cent. sodium citrate, introduced into the medium and allowed to remain at room temperature. Excellent growth was obtained in the water of condensation.

On the fifth day, pyriform, oval, and elongated forms, motionless and with granular protoplasm were seen. They were few in number and non-flagellated. The oval forms measured 7 by 4 microns, the longer 10 by 2 microns.

On the tenth day multiplication had taken place, the elements being smaller, still non-flagellated ; 6–8 microns in length by 2–3 in width.

By the fifteenth day occasional flagellated forms were seen, free, of the leishmania and leptomonad types, and more of a rounded or oval shape. Rosettes made up of ovoid or elongated forms were seen.

On the twentieth day sparse round or oval forms were present, singly or in groups, small, motionless, leishmanial in type, 3 by 2 microns. Long forms, however, predominated, markedly motile, possessing flagellum but no undulating membrane. Four days later minute leishmania forms, grouped in large numbers, and many freely moving flagellated forms were observed, 35–50 microns in length (exclusive of the flagellum) by 1·5–3 microns in width. The various forms are well depicted on two coloured plates.

H. Harold Scott.

Muniz (Julio). Sobre algumas formas interessantes encontradas em culturas de *Trypanosoma cruzi*. [**Some Interesting Forms found in Cultures of** *T. cruzi*.]—*Bol. Biol.* São Paulo. 1927. Apr. 11. No. 5. pp. 16–19. With 9 figs. [Oswaldo Cruz Inst., Rio de Janeiro.]

——. Quelques formes intéressantes trouvées dans des cultures de *Trypanosoma cruzi*.—*C.R. Soc. Biol.* 1927. Aug. 26. Vol. 97. No. 25. pp. 821–823. With 7 figs. [Oswaldo Cruz Inst., Rio de Janeiro.]

This note relates to certain forms found in a culture of *T. cruzi* in NNN medium. It is recorded that large numbers of delicate forms of the trypanosome were found similar to those described by Chagas in the salivary glands of Triatoma.

The forms, however, to which the author desires to draw particular attention consist of groups of banana-shaped elements grouped like the segments of an orange. These agglomerations are of two distinct types ; the first consisting of a dozen or more elements each with a small condensed nucleus and some showing a blepharoplast, the second consisting of large and less numerous elements with a voluminous nucleus in which the chromatin is arranged in rays. There is still a third interesting type consisting of banana-shaped elements which probably represents a previous stage to that already described ; the nuclei are very numerous and the chromatin is condensed ; these last forms have been found only in small numbers.

Reference is made to the fact that LEBEDEFF (1910) has found somewhat similar forms in cultures of *T. rotatorium*. Muniz records that in studying a culture about 15 days old he has seen numerous large crithidia moving very slowly *in situ*, and also a number of smaller and more delicate forms which exhibit rapid translatory movement. Whilst following one of these under the microscope he observed it approach one of the large comparatively motionless forms to which it became attached by its posterior extremity. After about 15 minutes the large form commenced to round up and exhibit movements within its cytoplasm, whilst the more delicate form diminished in length and increased slightly in breadth. After about 25 minutes the movements of the flagellum of the latter form became very intermittent. The observation was interrupted by drying of the preparation. The author believes what he saw represented fecundation.

W. Y.

DAVIS (L. J.) & BROWN (H. C.). **The Adhesion Phenomenon, a Specific Serological Reaction occurring in Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Aug. 31. Vol. 21. No. 2. pp. 113–124. [16 refs.] [Wellcome Bureau of Sci. Research, Endsleigh Gdns., London.]

Reference is made to the work of RIECKENBERG (1917) who showed that the blood of rats, which had recovered from, or been cured of, an infection with *T. brucei*, caused masses of blood platelets to become adherent to the trypanosomes *in vitro*. The reaction was specific, not only for the species of trypanosome, but also for certain strains employed, and sufficed to differentiate the original from relapse strains. RIECKENBERG emphasized the point that the reaction only occurred when citrated plasma was used and that he was unable to obtain it with serum. KRITSCHEWSKI and TSCHERIKOWER (1925), working with *T. equiperdum*, found that in this reaction the specificity did not reside in the platelets, for these could be replaced by those of normal vertebrates. They considered that the reaction depended upon a specific principle present in fibrinogen which they termed "thrombocytobarin," in that they claimed that the reaction would only take place when plasma and not when serum was used. They further showed that the antibody in question was thermostabile, but that the reaction depended upon the presence of normal complement. Later they found that the antibody could be produced by the injection of dead trypanosomes, and that the immune plasma could withstand a dilution of 1 in 12 without weakening the strength of the reaction. They failed to produce the reaction with the serum from clotted blood, but with the serum from defibrinated blood or with citrated plasma they obtained a strong reaction. KRANZ (1926), who worked with *Treponema duttoni*, found that the rôle of the platelets was merely mechanical, for bacteria would serve equally well as indicators of the reaction ; he showed that the serum from clotted blood gave a definite reaction in the case of this organism. It was subsequently found that the reaction would occur with other organisms, e.g., KRITSCHEWSKI and TSCHERIKOWER (1926) used *Leptospira icterohaemorrhagiae* and MESSIK (1927) obtained this adhesion phenomenon with *Leishmania tropica*, but failed to do so with a free-living amoeba referred to as *Amoeba limax*.

In their earlier experiments the authors confined their attention to a strain of *T. equiperdum* which killed mice in three to four days. For the production of immune plasma the infected mice were cured by a dose of 0·1 cc. of a 1 per cent. solution of "Bayer 205." After a suitable interval the mouse was killed with ether and the maximum amount (about 0·5 cc.) of blood obtained by cardiac puncture ; the blood was then added to an equal volume of 1 per cent. citrated saline, mixed and centrifuged. The trypanosome suspension was obtained from

moderately infected mice ; this blood was treated in the same way, but centrifuged slowly so as not to throw down the trypanosomes.

The test is made by mixing equal quantities of the immune plasma and trypanosome suspension in a small agglutination tube and incubating at 37° C. for about half an hour. A drop of the mixture is then examined by dark field illumination ; in a positive reaction the trypanosomes are seen to be freely motile though often exhibiting characteristic laboured movements ; adherent to them are seen formed elements of the blood—especially blood platelets, more rarely leucocytes, as also the smaller particles " blood dust " invariably seen in such preparations. All degrees of adherence may occur, from a solitary platelet stuck usually to the extremity of the flagellum to an almost complete envelopment of the organism by numbers of platelets. In many cases the trypanosomes are solitary, in others they tend to agglomerate in small masses, in and round which are entangled numerous platelets. As shown by Laveran and Mesnil this agglomeration is a non-specific phenomenon which often occurs when trypanosomes are exposed to the influence of foreign sera.

It was found that at least 5 days should elapse between the administration of the drug and the collection of the blood ; apparently it does not matter when the drug is given, provided it is after the definite establishment of the infection, but it must not be delayed until either the mouse becomes moribund or resistant strains of trypanosomes have developed. The optimum period of incubation varies from a few minutes at room temperature in the case of sera producing a well-marked reaction to one hour at 37° C. in less strongly marked reactions.

Rabbits were found capable of producing effective antibodies one week after infection without the use of any drug, but as the infection in these animals runs a chronic and usually fatal course, it is better to give a curative dose of 0·005 gm. of " Bayer 205 " per kilo. of body weight. No difficulty was experienced in producing antibodies in guineapigs both against trypanosomes and leptospira.

Experiments showed that contrary to the statements of Rieckenberg and of Kritschewski and Tscherikower serum is an efficient substitute for plasma. If the serum and plasma are taken under aseptic conditions and kept in the ice chest, the specificity remains for at least three weeks.

The actual titre which the serum or plasma of an immunized animal may reach varies considerably. In the case of immunized mice, titres of 1 in 12 to 1 in 18 were frequently obtained, but with guineapigs and rabbits considerably higher titres were produced. Further work confirmed the statement of Brussin that blood platelets served merely as indicators and that they could be replaced by bacteria. Colloidal inorganic suspensions served as did also gamboge ground up in saline and then filtered.

The antibody exhibits a high degree of thermostability and withstands 65° C. for two hours. Such results as the authors did obtain have not supported the view that the reaction is dependent upon the presence of complement. Experiments performed with the serum of animals immunized against *T. equiperdum*, *T. lewisi*, *T. rhodesiense* and *T. evansi*, respectively, showed absolute specificity. Similarly, working with several strains of leptospira, the authors experienced no difficulty in differentiating by means of this test two types, viz., the pathogenic *L. icterohaemorrhagiae* and the free living water strains *L. biflexa*.

In the concluding discussion regarding the nature of the antibody, the authors suggest that it may be allied to opsonin. There is at present no convenient word with which to designate the phenomenon. Russian workers have alluded to it as " the Rieckenberg," " thrombocytobarin " or " beladung " reaction. In view of the earlier observations of the French workers and of Rössle (1905), it is doubtful whether it should be called the Rieckenberg phenomenon. It has been shown that the term " thrombocytobarin " is inapplicable, and the authors suggest that the reaction might be called " the adhesion phenomenon."

W. Y.

Brussin (A.) & Beletzky (W.). Ueber die Verwertung des Rickenbergschen Phänomen bei Immunitätsfragen. [**Application of the Rickenberg Phenomenon to Immunity Questions.**]—*Arb. a. d. Microbiol. Inst. d. Volksunterrichtskomissariats.* 1926. Vol. 2. German summary p. 22. [In Russian pp. 5–22. Refs. in footnotes.]

An investigation of the Rieckenberg or thrombocytobarin phenomenon in connexion with *Trypanosoma equiperdum* infection of mice has shown that the reaction is highly specific and distinguishes not only different races of trypanosomes but also those of a relapse from those of a first attack and even those which occur at different stages of an infection. A single mouse may have in its blood at one time a number of these antibodies each specific for the particular race of trypanosome which stimulated its production. The blood of a mouse will retain these substances for 2½ to 3 months.

C. M. Wenyon.

Cordier (G.). Etude de la glycémie et action du sérum glucosé et de l'insuline dans quelques cas de trypanosomiase expérimentale. [**Glycaemia and Action of Serum-Glucose and Insulin in Experimental Trypanosomiasis.**]—*C.R. Soc. Biol.* 1927. Apr. 26. Vol. 96. No. 13. pp. 971–973.

The work of Kurt Schern has caused the author to examine the variations in the glycaemia of animals experimentally infected with a trypanosome of Morocco and with *T. equiperdum*, and also the effects of injections of serum-glucose and of insulin on the appearance and number of trypanosomes and on the duration of the infection.

In sheep, guineapigs and rats infected with the Moroccan virus the degrees of glycaemia had no definite relation to the degree of infection; in a horse the amount of blood sugar decreased regularly with the appearance of parasites, but tended to return to normal without, however, reaching it, during the last days of the infection.

In a horse infected with *T. equiperdum* the first clinical symptoms coincided with pronounced hypoglycaemia. At this time examination of the blood and tissue juices was negative, but inoculation of the blood into rats gave rise to infection. The hypoglycaemia was diminished by treatment and when the clinical symptoms disappeared the amount of sugar in the blood had recovered. In regard to the effects of serum-glucose and insulin on infections due to the Moroccan virus three series of rats were infected. The first series received each day 1 cc. of serum containing 5 per cent. of glucose, the second lot received each day insulin, and the third lot were kept as controls. Thirty-six hours afterwards

the blood was found to be positive in the rats injected with serum-glucose and in those kept as controls without any appreciable difference in the number of trypanosomes. The following day the rats to which insulin was given also showed parasites. One of the control rats died on the fifth day, the following day the rats to which insulin was given died, and two days later the rats treated with serum-glucose and the remainder of the controls. In view of the fact that there was no appreciable difference between the course of the infection in rats treated with serum-glucose and the controls, it can be assumed that trypanosomes of the Moroccan strain are not directly dependent on the glucose of the organism.

In guineapigs infected with the strain the duration of life is considerable, although the blood at times contains numerous parasites. Injections of serum glucose and of insulin had no effect on the course of the infection in two of these animals.

W. Y.

Regendanz (P.) & Tropp (C.). Das Verhalten des Blutzuckers und des Leberglykogens bei mit Trypanosomen infizierten Ratten. [**The Behaviour of the Blood Sugar and the Liver Glycogen in Rats infected with Trypanosomes.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Aug. Vol. 31. No. 8. pp. 376–385. [10 refs.] [Inst. for Ship & Trop. Dis., Hamburg.]

The authors have examined the behaviour of the blood sugar in a considerable series of rats infected with trypanosomes in order to elucidate further the question of the occurrence and significance of its removal in trypanosomal diseases. They have reached the conclusion that in infected rats it is only shortly before death that the sugar is markedly decreased in amount. The disease is not due to consumption by the parasites, but to the effect of their toxins on the sugar-formation organs.

The glycogen content of the liver of rats which have died from trypanosomiasis is lowered, but is still sufficient to maintain the blood sugar at its normal value.

Death in trypanosome-infected rats is not due to a lack-of-sugar intoxication, but to the action of toxins of the parasites.

W. Y.

Bruynoghe, Dubois & Bouckaert. Le sucre du sang au cours des trypanosomiases expérimentales. [**The Blood Sugar in the Course of Experimental Trypanosomiasis.**]—*Bull. Acad. Royal de Méd. Belge.* 1927. Feb. 26. 5th Ser. Vol. 7. No. 2. pp. 142–156. [10 refs.]

The authors have repeated and extended the observations of Schern on the effect of the blood sugar in experimental trypanosomiasis. They employed in their work *T. brucei ugandae* in mice, guineapigs and rabbits.

The following are the conclusions :—

1. In the course of intense blood infections the trypanosomes kept *in vitro* lose their mobility the more quickly the further the infection is advanced, except during trypanolytic crisis which intervenes as a factor in the opposite direction.

2. The immobilization of the trypanosomes *in vitro* is inhibited by the addition of various sugars, especially glucose, which blood constituent is evidently a normal food of the parasites.
3. The injection of insulin into an infected animal diminished definitely the length of survival *in vitro* of the trypanosomes.
4. The blood of animals with intense infection of some duration exhibits hypoglycaemia which may be notable.
5. The physiological mechanism of this hypoglycaemia is not associated purely and simply with the consumption of organic glycose by the parasites, or with hepatic lesions, but rather with an insulinic mechanism.
6. Analysis shows a diminution of the hepatic glycogen and an increase of muscular glycogen—a fact which is in accord with the above hypothesis.
7. The hypoglycaemia is of no import clinically.

W. Y.

Battaglia (Mario). Das Oedem bei den Trypanosomeninfektionen. [**Oedema in Trypanosomal Infections.**]—*Cent. f. Bakt.* 1. Abt. Orig. 1927. Aug. 5. Vol. 103. No. 4/5. pp. 267–268. [9 refs.]

The author states that oedema is a constant sign in all trypanosomal infections ; it may appear in the first period of the infection, or in an advanced stage, or finally in the cachetic period. The oedema is of a hard, myxoedematous type, wherever it appears. He recalls that in his examinations of the histological changes of the organs of experimentally infected animals he has found severe alterations in the thyroid and parathyroid glands. An account of the histological findings in these organs is given, and it is to these pathological lesions that the author attributes the oedema.

W. Y.

Iwanow (E.) & Mesnil (F.). Le trypanosome de la dourine traverse-t-il la peau ou les muqueuses saines? [**Can the Trypanosome of Dourine traverse Sound Skin and Mucous Membrane?**]—*Ann. Inst. Pasteur.* 1927. May. Vol. 41. No. 5. pp. 497–512.

The question whether trypanosomes can penetrate intact mucous membranes is still under discussion. According to some authors only *T. equiperdum* possesses this power, whilst others state that *T. brucei*, *T. evansi*, *T. gambiense* and *T. rhodesiense* have it also. Nattan-Larrier asserts that *T. equiperdum* can traverse not only the membranes of the eye, but also those of the mouth, vagina, rectum, and even the intact skin ; whilst Iwanow has reached quite the contrary opinion, and explains the successful results obtained by other workers on the hypothesis that there were minute abrasions of the surface.

In the present work the authors have re-investigated the subject. They employed a strain of *T. equiperdum* maintained many years in mice or guineapigs. The blood was withdrawn from mice on the last day of life, when it was swarming with trypanosomes, and diluted with sodium citrate solution. The experimental animals were examined carefully with the aid of a lens and all showing the slightest abrasion were set aside. The selected animals were placed in cages without straw or grass, the bedding, in the case of rabbits and guineapigs, consisting of sawdust and the food of fresh lucerne. The mice were kept in heavy glass bowls covered with wire netting and were fed on grains of sarrazin carefully examined, from which the grains of oats and barley were

removed. An experiment was not commenced until the selected animal had been kept under these conditions for a fortnight, so that any abrasion which had escaped observation had time to heal.

From experiments which are described, the authors conclude that like the other pathogenic trypanosomes *T. equiperdum* is unable to penetrate the unbroken skin or mucous membranes. They point out that this finding in no way contradicts what is known of the propagation of dourine, because even the slightest lesions suffice to allow the parasites to traverse the mucous surface. The authors believe that careful examination of the genital organs would lessen appreciably the percentage of cases of the disease, and they suggest that in places where dourine is prevalent artificial fecundation of the mares should replace the natural coitus.

W. Y.

Regendanz (P.) & Kilkuth (W.). Ueber die Bedeutung der Milz für die Bildung des vermehrungshindernden Reaktionsproduktes (Taliaferro) und dessen Wirkung auf den Infektionsverlauf der Ratten-Trypanosomiasis (*Tryp. lewisi*). Versuche der Uebertragung des *Tryp. lewisi* auf die weisse Maus. [**Significance of the Spleen in the Formation of Multiplication-Inhibiting Reaction Products (Taliaferro) and its Action on the Course of *T. lewisi* Infection. Transmission of *T. lewisi* to White Mice.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. Aug. 5. Vol. 103. No. 4/5. pp. 271–279. [20 refs.] [Inst. for Ship and Tropical Diseases, Hamburg.]

The following summary is given :—

1. The multiplication-inhibiting reaction product (Taliaferro) which appears in the serum of rats infected with *T. lewisi* is formed chiefly by th spleen.

2. The reaction product has no trypanocidal or lytic action, but simply inhibits multiplication of the parasites. The final disappearance of *T. lewisi* from the blood is likewise due to the development of trypanolytic or trypanocidal bodies.

3. After extirpation of the spleen *T. lewisi* infection in rats is severe and may be even fatal.

4. *T. lewisi* is not transmissible to white mice from which the spleen has been removed.

W. Y.

Battaglia (Mario). Akute und chronische Speicheldrüsenentzündung bei experimentellen Trypanosomiasen. [**Acute and Chronic Inflammation of the Salivary Glands in Experimental Trypanosomiasis.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6/7. pp. 382–385. [9 refs.]

The author states that in his prolonged studies on the pathogenic trypanosomes of animals, he has found that the parasites pass from the placenta to the foetus, and that they are polymorphic in their development, exhibiting a filterable phase in which they will pass through a porous candle capable of holding up *Micrococcus melitensis*, and a non-filterable phase. The trypanosomes produce pathological lesions in all the animal tissues from the skin to the central nervous system.

In animals with experimental trypanosomiasis (*T. vespertilionis*, *T. lewisi*, *T. dromedarii* and nagana) lesions –sometimes acute and sometimes chronic—of the salivary glands were observed. The author gives an account of the clinical and pathological appearances.

W. Y.

Takeyama (Sadawo). [**On the Trypanosomicidal Action of Bacterial Toxins. Communication I.**]—*Fukuoka Ikadaigaku Zasshi* (*Jl. Fukuoka Med. Soc.*) 1926. Oct. Vol. 19. No. 10. [Summarized in *Japan Med. World.* 1927. May 15. Vol. 7. No. 5. p. 147.]

After referring to the work of Levaditi and Twort on *Bacillus subtilis*, the author remarks that he has demonstrated the existence of a trypanocidal substance produced by *Bacillus mesentericus fuscus* Flügge. This substance is free in the culture fluid and can be removed by dialysation. It is unstable in sun-light, and also in heat and after shaking and desiccation, but resistant to cold and X-rays. It had a prophylactic and curative action for *T. lewisi*, but was powerless against *T. gambiense* and *T. equiperdum*.

W. Y.

Brumpt (E.). Eclectisme alimentaire des réduvidés vecteurs du *Trypanosoma cruzi*. [**Food Eclecticism in Reduviid Carriers of *T. cruzi*.**]—*Presse Méd.* 1927. Sept. 24. Vol. 35. No. 77. pp. 1161–1162. With 4 text figs.

The author speaks of food eclecticism in a sense very different from that commonly current, applying it to Reduviid bugs whose tastes are so far from exclusive that they will feed not only on man, mammals, birds and insects, but also (as he has discovered lately) on reptiles and frogs. His attention was drawn to this matter by observing the existence of *Triatoma rubrovaria* in stony tracts in Uruguay where iguanas and another smaller species of lizard were the only vertebrates visible. As he expected in these circumstances, he found that the larvae of this Reduviid fed without hesitation on the (small) lizards—though they attacked a small bat that he had in his possession with equal relish. On returning to Paris he found that his captive Reduviids would feed on the grass snake (*Tropidonotus natrix*), a lizard (*Lacerta viridis*), a freshwater tortoise (*Emys lutaria*) and a frog. On one occasion large nymphs of *Triatoma megista* immediately after a preliminary repast on a pigeon, indulged themselves to fatal repletion on a snake. These facts suggest to the author the possibility of reptiles and batrachia being natural reservoirs of *Trypanosoma cruzi*, since Nino at Buenos Aires inoculated a toad, *Bufo marinus*, with that trypanosome—although Brunni failed in his attempts at so infecting batrachians.

A. Alcock.

Carpenter (G. D. Hale). Some of the Problems connected with Sleeping Sickness. A Paper communicated to the Zoological Section of the British Association for the Advancement of Science. 10 pp. 1926. Aug. 9.

King (Harold). Trypanocidal Action and Chemical Constitution. Part VI. Amphoteric s-Carbamidoarylarsinic Acids.—*Jl. Chem. Soc.* 1927. May. pp. 1049–1060. [National Inst. Med. Research, Hampstead.]

HELMINTHIASIS.

Chatterji (Dhruba Mohan). **The Incidence of Intestinal Parasites in a Calcutta Hospital Population.**—*Indian Med. Gaz.* 1927. May. Vol. 62. No. 5. p. 252.

During 1925–6 a routine examination was made of the stools of the 371 patients admitted to the surgical wards of the Calcutta Medical College Hospitals and is of interest as revealing the percentage of Calcutta natives harbouring various parasites.

Table I.—General Findings.

	Per cent.
Ankylostoma ova in 43 specimens	11·6
Ova of *Trichuris trichiura* in 11 specimens ...	3
Ova of *Taenia saginata* in 2 specimens	0·5
Ova of *Ascaris lumbricoides* in 20 specimens ...	5·4
Ova of *Hymenolepis nana* in 5 specimens	1·3
Ova of *Oxyuris vermicularis* in 3 specimens	0·8
Trichomonas hominis in 23 specimens	6·2
Chilomastix mesnili in 5 specimens	1·3
Lamblia intestinalis in 14 specimens	3·8
Endolimax nana in 17 specimens	4·6
Entamoeba histolytica, or its cysts, in 12 specimens ...	3·2
Entamoeba coli, or its cysts in 20 specimens ...	5·4
Iodamoeba butschlii in 1 specimen	0·3
Strongyloides larvae in 7 specimens	1·9

Table II.—Classification by Caste and Sex.

	Per cent.
Total number of stools examined of Hindus was 193: of these, the number of positives, i.e., those which show some sort of parasites or ova was 87	45·1
Total number of stools examined of Mahomedans was 68: of these the positives were 28	41·2
Total number of stools examined of Europeans was 98: of these the positives were 23	23·5
Total number of stools examined of other castes was 3: of these only 1 was positive	33·3
Total number of stools examined of male patients was 304: of these the positives were 119	39·1
Total number of stools examined of female patients was 60: of these the positives were 20	33·3

R. T. Leiper.

de Mello (Froilano) et al. Note sur la fréquence des parasitoses intestinales à l'Inde Portugaise par les élèves du cours de microbiologie Luis Gabriel Figueiredo, Constancio Roque Monteiro, Govinda Xencora Naique, Roque Eduardo Furtado, Miguel Carvalho, Visnumdassa Corongoto & Balchandra Narconim Sanvordencar. Travail entrepris sous la direction et avec la colaboraton effective du Prof. Froilano de Mello. [**Frequency of Intestinal Parasites in Portuguese India.**]—*Arquivos da Escola Méd.-Cirurg. de Nova Goa.* 1927. Ser. A. No. 1. pp. 29–48. [Bact. Inst., Nova Goa.]

The contents of this paper are mainly statistical, dealing with the incidence of various parasites in certain districts and villages of

Portuguese India. 596 cases gave the following percentages of infection: Ascaris 75 per cent., Trichocephalus 48 per cent., Ankylostomes 32 per cent., Strongyloides 7 per cent., Oxyuris 8 per cent., Taenias 2 per cent.

R. T. L.

Mills (Ralph G.). **Parasites, chiefly Metazoan, observed in 7,000 Specimens of Feces from Koreans, with an Attempt to interpret the Findings.**—*Amer. Jl. Hyg.* 1927. May. Vol. 7. No. 3. pp. 222–263. With 5 text figs. [55 refs.]

Mills summarizes the records of the Clinical Laboratory of the Severance Union Medical College between September, 1913 and June, 1917. The results represent fairly well the conditions prevailing in the population at large, as the hospital clientèle represented all classes of the Korean people in about the true proportion. The survey is, therefore, not a parasitological one as relatively few applied for treatment of parasitic infections. *Ascaris lumbricoides* is a surprisingly uniform infestation irrespective of occupation. Home conditions are more important than all other factors. Infection is most probably due to cultivation of family garden plots, eating with unwashed hands and contamination of food, especially fresh vegetables and salt pickle. *Oxyuris vermicularis* is associated with lack of cleanliness, scarcity of soap, eating with unwashed hands and contamination of bedding. Hookworm disease is rare, while hookworm infection with small numbers is prevalent. The habits of the Korean people are not favourable to the production of extremely severe infections. *Strongyloides intestinalis* is relatively unimportant. *Clonorchis sinensis* is attributed to the eating of dry rather than raw fish. Bilharziasis is absent. This interesting paper concludes with a description of the disposal of night soil and the preparation of fertilizers practised by the Korean people. The author does not believe in racial immunity to helminth infestation, inclining rather to the belief that light infections depend on local conditions.

R. T. L.

McCulloch (W. E.). **The Incidence of Amoebic and Helminthic Infections in Kano and Katsina Cities, Northern Nigeria.**—*Jl. Trop. Med. & Hyg.* 1927. May 2. Vol. 30. No. 9. pp. 117–119.

Owing to a severe outbreak of amoebic dysentry in the Kano Administration Prison, the author undertook a microscopic examination of the stools of 500 natives to ascertain the degree of parasitic infestation in Northern Nigeria, of which Kano is the industrial centre and Katsina the headquarters of learning and agriculture. Katsina showed a much higher incidence rate of infection with Ancylostoma and Ascaris, whereas *Entamoeba histolytica* proved far more prevalent in Kano. A peculiar feature of 17 cases of ankylostomiasis was the occurrence of local swellings, fever, and eosinophilia. Tapeworm infection with *Taenia saginata* is practically universal and forms a large percentage of the out-patient practice. The native method of cooking meat in balls of solid beef leaves the centre quite raw. Both species of Schistosoma infection are common. Microfilariae are rare and only four cases of elephantiasis have been seen by the author among 6,000 cases

examined. Dracontiasis is extremely common in both Kano and Katsina. Twenty-five per cent. of all ulcers seen at the Katsina hospital are due to guinea-worm.

R. T. L.

Callanan (J. C. J.). **A Record of the Occurrence of Intestinal Parasites in Patients at the Native Hospital, Nairobi.**—*Kenya & East African Med. Jl.* 1927. July. Vol. 4. No. 4. pp. 103–113.

Examination of single faecal specimens in 1,000 cases gave 48·7 per cent. infection with helminths. The species which occurred were Hymenolepis, *Taenia saginata, Ascaris lumbricoides, Trichuris trichiura,* Ancylostoma, *Strongyloides intestinalis, Heterodera radicola* and *Schistosoma mansoni.* The author gives several tables showing the varying combinations of species which were observed.

R. T. L.

Wiltshire (H. G.). **Some Observations of Intestinal Parasites of Natives at Mlanje.**—*Nyasaland Protectorate Ann. Med. Rep. for Year ending 31st Dec. 1925.* Appendix II. pp. 30–33.

Wiltshire has given in tabular form results of routine examination of faeces of 30 patients attending the Mlanje Native Hospital and an equal number of natives in normal health, viz. policemen, warders and hospital attendants. His analysis shows a great preponderance of amoebic and schistosome dysenteries. The helminth infections among the 60 cases were *Ascaris lumbricoides* 21, *Ancylostoma duodenale* 17, *Schistosoma mansoni* 8, *Strongyloides intestinalis* 4, and *Taenia solium* 4. These figures are regarded by the author as minimal. A concentration method would almost certainly have given higher figures. The absence of whipworm eggs is notable.

R. T. L.

Sicé (A.). Le parasitisme intestinal dans le sud de Madagascar. [**Intestinal Parasitism in the South of Madagascar.**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 464–467.

In southern Madagascar *Taenia saginata* is common. Nematode infections are also very prevalent—Ascaris 90·6 per cent., Trichuris 93·3 per cent., hookworm 1·6 per cent., *Oxyuris vermicularis* 21·7 per cent.

R. T. L.

Popoff (P. P.). L'helminthologie médicale en l'U.S.S.R. de 1921 à 1927. [**Medical Helminthology in U.S.S.R. 1921-1927.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 5. French summary pp. 324–328. [10 refs.] [In Russian pp. 265–270.]

M. Popoff as Chef de Service of the Tropical Institute of Moscow summarizes the results obtained during the last six years in the domain of helminthology by workers in Soviet Russia, and lists 5 trematodes, 7 cestodes and 17 nematodes, with an unidentified species of Acanthocephala as parasites of man in Russia. The paper contains an eloquent tribute to Professor Scriabine.

R. T. L.

Mtchedlidze (I. Z.). Sur l'extention dans l'Adjaristan de l'invasion vermineuse en général et de l'ankylostomiase en particulier. [**Distribution of Hookworms and other Helminths in Adjaristan.**] —*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 5. French summary pp.304–305. [In Russian pp. 302–304.]

The first enquiry into the helminth fauna of Adjaristan (Batoum) was undertaken in 1925 when the first case of ankylostomiasis of local origin was noted. Anthelmintic treatment has now established the presence of an endemic centre of hookworm in Adjaristan. From the records of the antimalarial station during 1925–6 it appears that 100 per cent. of the population is infested with helminths, *Ascaris lumbricoides* and whipworm predominating. *Taenia saginata* and *T. solium* occur in 5 per cent. and *Hymenolepis nana* in 2 per cent.

R. T. L.

Oleinikov (S. V.). [**Helminthic Infections in Ufa detected in Scrapings from the Peri-Anal Folds.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 3. pp. 162–164. [In Russian.]

For the detection of helminthic infections in Ufa (Eastern Russia) the author examined scrapings from the peri-anal folds of 927 persons of different ages. A flat polished wooden rod was introduced into the anus to a depth of 1½—2 cm, and the material thus obtained together with the scrapings was examined microscopically. Eggs of the following forms were detected by this method: *Ascaris lumbricoides, Trichuris trichiura, Taenia solium, T. saginata, Hymenolepis nana.*

C. A. Hoare.

de la Barrera (J. M.) & Riva (A.). Indice de helmintiasis intestinal en la población escolar de la República Argentina. (Provincia de Corrientes). [**Index of Intestinal Helminth Infection in Schools of Argentine.**]—*Semana Méd.* 1927. Aug. 18. Vol. 34. No. 33 (1753). p. 467. [Bact. Inst., National Dept. of Hyg., Buenos Aires.]

In this brief preliminary note the authors give a statistical summary of the degree of infection in 1,689 pupils in 47 schools in the Province of Corrientes in the Argentine Republic. 73·4 per cent. were found infected with parasites. Hookworm occurred in 68·85 per cent.; whipworm 10·59 per cent., *Ascaris lumbricoides* 3.49 per cent., *Hymenolepis nana* 1·83 per cent., *Taenia saginata* 1·07 per cent. and *Strongyloides stercoralis*, ·12 per cent. Within the Province the incidence varies from 80 per cent. and 100 per cent. to 3 per cent.

R. T. L.

Hein (Gordon E.). **Cedar Oil as an Aid in finding Parasitic Ova in Feces.**—*Jl. Lab. & Clin. Med.* 1927. Aug. Vol. 12. No. 11. pp. 1117–1118. With 2 text figs. [Univ. of California Med. School. San Francisco, Calif.]

A smear of faeces from about five to ten times as heavy as ordinarily would be used is made upon a slide and allowed to dry. If this is

cleared with cedar oil and and examined under a coverslip ova can be found without difficulty where repeated search of fresh smears without concentration failed to reveal them.

R. T. L.

Fernán-Núñez (M.). **A Contribution to Helminthic Therapy.**—*Jl. Amer. Med. Assoc.* 1927. Mar. 19. Vol. 88. No. 12. pp. 903–905.

Fernán Núñez finds that the best drug against Trichocephalus is the sap of *Ficus laurifolia* (Leche de Higueron). It is not easily obtainable however and the best alternative is oil of chenopodium, a single dose of 40 minims followed by an ounce of castor oil being recommended. The drug *must* be fresh and pure or it may prove toxic. He finds that intramuscular injections expel both whipworms and oxyuris and he has treated 69 cases successfully in this way. Intravenous injections in 13 cases were likewise successful; while the use of arsphenanines intravenously is partly successful. Injection of dogs with a vaccine prepared from the eggs of Trichocephalus seemed to prevent the development of adults in these animals.

T. W. M. C.

Fernán-Núñez (M.). **Intravenous Injections of Vermifuges.**—*Vet. Med.* 1927. June. Vol. 22. No. 6. pp. 227–229.

Oil of chenopodium is stated to be the most satisfactory vermifuge against hookworm and oxyuris. A single dose of 40 minims followed immediately by an ounce of castor oil is less dangerous than, and as efficient as the usual method of divided doses. From a few cases the author concludes that oil of chenopodium by intramuscular or intravenous injection is a specific against whipworm and oxyuris. The injection of whipworm eggs into dogs at three day intervals for one month apparently conferred an immunity against re-infection for seven to twelve months.

R. T. L.

Carman (J. A.). **A Note on the use of Glycerin as an Anthelmintic in Ankylostomiasis.**—*Kenya & East African Med. Jl.* 1927. July. Vol. 4. No. 4. pp. 123–125. [1 ref.]

From a study of ten cases by the direct flotation method the author concludes that glycerin will not remove hookworms even in lightly infected cases and cannot be recommended as an anthelmintic.

R. T. L.

Shillinger (Jacob E.). **Anthelmintic Properties of Santonin.**—*Jl. Agric. Res.* 1927. May 1. Vol. 34. No. 9. pp. 839–845. [2 refs.]

Critical testing on dogs, swine and horses shows an anthelmintic value for santonin much below that recently claimed. Its chief advantage is the ease of administration. The author is of opinion that it is a much over-rated drug at present, but that it has value especially in repeated treatment, principally as a drug which does not cause irritation and may therefore be used in cases with gastro-enteritis.

R. T. L.

Bougenault. Note sur l'emploi de l'émétique en lavements dans : I.—Un cas de bilharziose intestinale. II.—Deux cas de vers de Guinée. [**Tartar Emetic per Rectum in Schistosomiasis and Dracontiasis.**—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 285–286. [2 refs.]

Bougenault has administered emetine, per rectum, to a case of schistosomiasis with success, giving 0·25 gm. in 50 gm. of water daily for six days. A similar treatment for guinea-worm in two different cases resulted in the disappearance of the parasite.

R. T. L.

Martini (E.). Neues ueber Wanderungen und Wirtswechsel bei parasitischen Würmern. [**Recent Work on Migrations and Life Histories of Parasitic Worms.**]—*Ztschr. "Die Erde."* 1925. Vol. 3. No. 1. pp. 24–28.

This short communication briefly deals with the more recent additions to knowledge concerning certain of the tapeworms and round-worms, referring more specially to the work of Rosen and Janicki on the development of Dibothriocephalus and allied forms and recent additions to knowledge concerning the life-history of *Filaria loa* and Ascaris.

R. T. L.

Toh (Sai). [**On the Results of Examination of the Intestinal Parasites and Visceral Parasites of the Koreans.**]—*Chosen Igakkwai Zasshi (Jl. Chosen Med. Soc.)* 1926. Aug. No. 66. [Summarized in *Japan Med. World.* 1927. Mar. 15. Vol. 7. No. 3. pp. 78–79]

Toh examined 2,000 Koreans together with 400 patients applying to the hospital. The most widely spread parasites are ascaris, hookworm and whipworm.

R. T. L.

i. Semenow (G.). Aperçu général de la distomatose, provoquée par *Fasciola hepatica* L. en rapport avec sa propagation en Asie Centrale. [*Fasciola hepatica* **Infection in Central Asia, treated with Emetine.**]—*Pensée Méd. d' Usbekistane.* 1927. No. 2. French summary p. 117. [In Russian pp.13–29. With 3 text figs. 45 refs.]

ii. —— & Kogan (D.). Un cas de distomatose, provoquée par *Fasciola hepatica* L. et guéri par les petites portions de chlorhydrate d' émétine.—*Ibid.* French summary p. 118. [In Russian pp. 30–38.]

iii. Pawlowa (O. N.) Zur Klinik und Therapie der Leber-Distomatose. —*Ibid.* German summary pp. 118–119. [In Russian pp. 39–46. With 1 chart in text. 8 refs.]

i. Semenow gives a general account of the appearance and prophylaxis of *Fasciola hepatica* infestation, 19 human cases of which have been reported from Russia up to 1926.

ii. A new case of Fasciola infection in a woman is recorded. Emetine was given and appeared to cure the infection.

iii. Pawlowa discusses the clinical appearance and blood picture in Fasciola infections in man. Therapeutic measures include the intramuscular injection of emetine.

R. T. L.

Paul (Fritz). Distomiasis hepatica (Leberegelseuche) beim Menschen. [**Liver Fluke in Man.**]—*Med. Klin.* 1927. June 3. Vol. 23. No. 22 (1173). pp. 829–834. With 9 text figs. [11 refs.]

The common liver fluke of sheep, *Fasciola hepatica*, is seldom found in man; not more than 40 cases have been reported in the last 100 years. The author contributes details of two further cases.

R. T. L.

Leon (M.). Accouplement et fécondation du *Fasciola hepatica*. [**Copulation and Fecundation in** *F. hepatica*.]—*Ann. Parasit. Humaine et Comparée*. 1927. July 1. Vol. 5. No. 3. pp. 236–238. With 1 fig. [4 refs.] [Faculty of Med., Jassy.]

A photogram is given showing two specimens of *Fasciola hepatica in copula*. The flukes are opposed by their ventral surfaces and the carrier of one is inserted in the vagina of the other and vice-versa.

R. T. L.

Bugge (G.). Zur Entwicklung der *Fasciola hepatica*. I. Entwicklung des Darmes. [**Development of Gut of** *F. hepatica*.]—*Deut. Tierärzt. Woch.* 1927. Sept. 3 & 10. Vol. 35. Nos. 36 & 37. pp. 575–581; 594–596. With 7 text figs. [19 refs.] [Municipal Meat Inspectorate, Berlin.]

This contribution discusses in considerable detail the development of the dendritic gut so peculiarly characteristic of the genus *Fasciola*.

R. T. L.

Pigoulewsky (S. W.). Un cas de *Fasciola gigantica* Cob. chez un enfant usbék en Vieux Taschkent. [**Case of** *F. gigantica* **Infection in an Usbek Child in Tashkent.**] —*Pensée Méd. d'Usbekistane*. Taschkent. 1927. No. 6–7. French summary p. 131. [In Russian pp. 59–61. 7 refs.]

The diagnosis is based on the finding of eggs in the faeces.

R. T. L.

Stoll (Norman R.), Cort (W. W.) & Kwei (W. S.). **Egg-Worm Correlations in Cases of** *Fasciolopsis buski* **with Additional Data on the Distribution of this Parasite in China.**—*Jl. Parasit.* 1927. Mar. Vol. 13. No. 3. pp. 166–172. [4 refs.]

The success of egg counts in securing information on the severity of hookworm infestations suggested the application of the same method to other worm parasites and the authors have taken the opportunity to study intensively six individuals infected with *Fasciolopsis buski*. The investigation of this parasite proved to be relatively simple and generally speaking the results were considered to be more accurate than those as obtained for hookworm. It was ascertained that the egg output per fluke per day ranged from 14,623–48,125 ova; the mean output lying between 21 and 28 thousand ova. The dilution egg counting method proved to be superior to the smear method in determining the incidence of infection. A useful table is given showing, from an examination of 6,009 persons, the incidence of *F. buski* in several parts of the Kiangsu Province of China. Only 88 cases were found, forming less than 2 per cent. of the number of cases examined.

R. T. L.

Barlow (C. H.). **The Treatment of Fasciolopsiasis.**—*China Med. Jl.* 1927. Mar. Vol. 41. No. 3. pp. 253–265. With 1 plate & 1 chart. [6 refs.]

Fasciolopsis infection has long been known to Chinese doctors, who have used areca-nut combined with cathartics in its treatment. It has been largely superseded by turpentine which, however, is liable to produce nephritis. Carbon tetrachloride is the most efficacious drug which the author has employed, but it has been attended with untoward results and on this account he does not recommend it. Where the cases have taken the drug well the cure has been prompt and complete and there have been no after effects. Oil of chenopodium required repeated doses. B-naphthol proved much superior in its action, and it is the drug of choice because of its relative safety, cheapness and ease of administration. The most effective dose for adults is 75 grains administered in three half-hourly portions; for a very weak child from 12–21 grains and for a sturdy child 60 grains may be given in similarly divided doses.

R. T. L.

Semionow (G. M.) & Garmatty (K. I.). Un premier cas de constatation en U.R.S.S. de l'invasion humaine par *Fasciolopsis buski* Lank. [**First Case of Human Infestation by** *F. buski* **in U.S.S.R.**] *Pensée Méd. d' Usbekistane.* Taschkent. 1927. No. 6–7. French summary pp. 130–131. [In Russian pp. 49–57. With 3 figs. 14 refs.]

Fasciolopsis buski has not been recorded up to the present time from Soviet Russia. The present case had visited India in 1914.

R. T. L.

Scriabin (K. I.), Podiapolsky (V. P.), Sankin & Limtcher (L. F.). [**The First Case of Pulmonary Paragonimiasis discovered in U.S.S.R.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 2. pp. 75–82. [In Russian.]

This case though referred to as the first discovered in Russia, is actually that of a Korean, who had been resident in the country for several months only, having contracted the infection in the Far East.

Faecal examination revealed the following parasites: *Ancylostoma duodenale, Paragonimus ringeri, Taenia saginata, Trichuris trichiura, Enterobius vermicularis.* By means of X-rays 12 foci of Paragonimus were located in the lungs. Treatment was successfully carried out with emetine hydrochloride. Doses of 1·25 cc. of a 2 per cent. solution were administered subcutaneously four times a day five days in succession. After an interval of a fortnight the course was repeated. Examinations of sputum during two months following treatment revealed no more eggs of the fluke.

C. A. Hoare.

Martin (S. H.). **Paragonimiasis and its Treatment.**—*China Med. Jl.* 1927. May. Vol. 41. No. 5. pp. 457–460. [3 refs.]

The emetine treatment of two cases of paragonimiasis was greatly shortened by the initial use of mercurochrome. One of the cases required seventy injections of emetine alone to produce a cure. Tartar emetic does not seem to be as effective in this disease as in schistosomiasis.

R. T. L.

Faust (Ernest Carroll) & Khaw (Oo-Keh) assisted by Ke-Fang (Yao) & Yung-an (Chao). **Studies on** *Clonorchis sinensis* **(Cobbold) with a Consideration of the Molluscan Hosts of** *Clonorchis sinensis* **(Cobbold) in Japan, China and Southeastern Asia and other Species of Molluscs closely related to them** by Bryant Walker.—*Amer. Jl. Hyg.* Monographic Series No. 8. 1927. Mar. pp. xi+284. With 14 plates and 33 text figs. (4 maps).

In these studies the authors cover practically the whole field presented by the problem of Clonorchis infection in China. The opening chapter gives an historical résumé in which they express the opinion that Looss was not only in error zoologically speaking in creating two species of Clonorchis, purely on size differences after a study of preserved specimens, but that he perpetuated a fallacy in regarding *Clonorchis endemicus* as pathogenic and *C. sinensis* as non-pathogenic.

While dogs and cats commonly harbour Clonorchis in north and central China human cases are unknown in North China and are rare in the Yangtse valley where cats are found uninfected. Human infection in China is almost entirely confined to the Kwangtung Province.

The second chapter deals with biological and morphological studies on the consecutive phases in the life-cycle of the parasite. Self-fertilization was frequently observed. Egg laying is independent of egg formation, the supply of eggs being stored up for some time in the coils of the uterus, resulting in their further development. Embryonic development takes place *in utero*. Egg formation begins in worms which are about 14 days old, but the eggs are usually absent from the faeces until about the 28th or 30th day. The Clonorchis egg resembles closely that of Metorchis. The eggs do not hatch spontaneously. The authors consider that a mechanical factor is important in bringing about hatching. The miracidium, sporocyst and redia are carefully described. Although the mollusc *Parafossarulus striatulus* is reported throughout the entire area in which Clonorchis infection is endemic in China, the authors have never found it infective in ponds containing infected fishes. *Bithynia fuschsiana* appears to be the chief species actually concerned in N. China. They regard *Bithynia longicornis* as a less important, potential host.

Melania hongkongensis can also act as an efficient intermediary under certain conditions. The morphology of the cercaria is described and it is stated that it can live a free existence for a period of 24–48 hours after which encystment occurs either in a fresh water fish or free in water. In the latter case the encysted larvae lying at the bottom of the water die when the reserve of food has been exhausted. Over 30 species of fishes are listed as intermediary hosts of the encysted cercaria. *Pseudorasbora parva* is the fish most commonly involved, but appears to be less heavily infected in China than in Japan. In Peking a most commonly infected fish is a Cyprinoid *Hemiculter kneri*. Practically any mammal that consumes raw fish in the Sino-Japanese areas is a potential host.

Chapter 3 deals with epidemiology. Clonorchis infection is confined to the Orient. There is no indication that the endemic area has ever extended as far as the Philippine Islands. Text figures and maps are given to illustrate in detail the epidemiology in China.

In chapter 4 the authors' studies on experimental therapy are detailed, particularly the effects of merchurochrome and gentian violet.

Chapter 5 discusses the prevention of clonorchiasis in man. The problem is practically limited to endemic regions in which raw fish is considered a delicacy or in which semi-raw fish is consumed. Sterilization of fish for human consumption by heat, and the sterilization of faeces in endemic regions are the two lines along which the practical solution of the problem can be attained.

The monograph concludes with a chapter by Dr. Bryant Walker on the Molluscan hosts of *Clonorchis sinensis* and species related to them. There is an extensive bibliography arranged historically and listed again alphabetically under authors. R. T. L.

OLDT (Frank). **Is Clonorchis a Health Menace in China?**—*China Med. Jl.* 1927. Mar. Vol. 41. No. 3. pp. 185–204. With 2 diagrams. [6 refs.]

There is a very heavy infestation with *Clonorchis sinensis* among the farmers round Siu Laam in Kwangtung. Fish from this region are sold to Canton, Hongkong and other places. Around Canton there is 20–30 per cent. human infestation and here human consumption of raw fish is prevalent. The price of the fish is so high as to preclude its being fed to dogs and cats, which are consequently only slightly infected. The fish, eaten raw, come from ponds in the mulberry districts. Laboratory records show that there is a preponderance of infection in males as compared with females, and it is explained that raw fish is usually eaten in restaurants which Chinese women do not patronize. Owing to the expensive nature of the fish there is a significantly large proportion of infection among business people, for poorer people cannot afford to eat it. Those farmers who raise and eat their own fish become infected; those who do not raise fish cannot afford to buy it, and are clonorchis free. The evidence presented by the author indicates that clonorchis infestation is a sharply limited disease, depending upon the custom of consuming raw fish. Under present conditions there is no danger of infestation spreading beyond its present boundaries or of being introduced into other countries. The incidence of liver troubles is more than twice as great in positive as in negative cases. Gall stone, Banti's disease, cancer, and liver disease with ascites predominate in clonorchis positive cases. The author considers that this infestation must be regarded as an exciting cause of cancer. From his clinical studies he concludes that the presence of clonorchis does not ordinarily excite symptoms and that there is no group of symptoms that could be properly called clonorchiasis. Considering all factors clonorchis infestation is probably less harmful than ascaris. Heavy infestations, however, produce serious pathological conditions in the liver in some cases. In the discussion of the paper Dr. FAUST referred to the liver enlargement in 50 per cent. of cases and the definite gastro-intestinal symptoms noticed by Japanese workers. While agreeing that the answer to Dr. Oldt's query is "No," such unqualified answer cannot be given in regard to adjacent endemic areas. R. T. L.

SHIRAI (Mitsuji). **Studies on the Treatment of Experimental Liver-Distomiasis with "Neostibnal."**—*Scientific Reports Govt. Inst. Infect. Dis.* Tokyo. 1926. Vol. 5. pp. 633–645. With 5 figs. on 1 plate. [11 refs.]

By modifying stibnal, the author has prepared a new drug "neostibnal" which is an alkalified sodium antimony tartrate. When

dogs infested with *Clonorchis sinensis* were given 15 intravenous injections of 0·011 gm. per kilo of body weight on alternate days, 75 per cent. of the worms in the liver were exterminated, while 45 per cent. were killed when 18 injections of 0·0088 gm. were used. The parasites from treated cases showed remarkable atrophic changes. The yellowish red granules filling the excretory bladder of the worms were shown chemically to have originated from the drug. The parasite does not become drug-fast after repeated injection of neostibnal.

R. T. L.

Cordes (Wilhelm). **A Case of Clonorchiosis.**—*Fifteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1926. pp. 147–148.

This case of Clonorchis infection occurred in a Chinese from Canton who had entered Cuba eight years previously and had been admitted to hospital for malaria. Treatment with tartar emetic greatly reduced both the ascites and the number of eggs in the stool. The tenderness of the liver subsided and the organ reverted to normal size.

R. T. L.

Prommas (C.). **Report of a Case of *Opisthorchis felineus* in Siam.**—*Ann. Trop. Med. & Parasit.* 1927. Mar. 25. Vol. 21. No. 1. pp. 9–10.

Prommas records a case of *O. felineus* infection from Siam in a boy of 17 years, over 1,000 specimens being recovered from the slightly enlarged liver.

T. W. M. Cameron.

Nishigori (Masao). **The Life Cycles of Two New Species of Heterophyidae found in Formosa.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1927. Mar. No. 264. English summary pp. 2–3. [In Japanese.]

The English summary of the Japanese text states that this paper describes the structures and life-cycles in detail of two new species of Heterophyidae named *Monorchotrema taihokui* and *M. taichui*, an English version of which has been published as a joint paper with Dr. E. C. Faust [*ante*, p. 512].

R. T. L.

Asada (Junichi). [**Studies on the Life History of Katsurada's Heterophyes.**] —*Tokyo Iji-Shinshi* (*Tokyo Med. News*). 1926. Nov. Nos. 2498 & 2499. [Summarized in *Japan Med. World*. 1927. Mar. 15. Vol. 7. No. 3. p. 77.]

Numerous encysted cercariae were found in the "bora," a species of brackish water fish, very commonly eaten by the Japanese. Dogs and cats pass eggs of *Heterophyes katsuradaii* in 7–9 days after being fed upon these infested fish.

R. T. L.

Cawston (F. G.). **South African Fluke-Carriers.**—*Jl. Med. Assoc. S. Africa.* 1927. June 25. Vol. 1. No. 12. pp. 309–310. With 1 text fig.

Limnaea truncatula is very rare in the Union of S. Africa, so that its importance as a carrier of *Fasciola hepatica* is small, its place being taken by the larger species *L. natalensis*. From the latter species Bilharzia cercariae have been reported, but this occurrence must also

be exceedingly rare. It is remarkable that *Isidora africana*, the common intermediary of bilharzia in S. Africa, is seldom affected by amphistome cercariae, while *Isidora tropica* and *I. forskali* are heavily infested. The danger of introducing molluscs into new habitats is illustrated by the presence of *Limnaea natalensis*, which are now found breeding in the pool which forms part of the War memorial in the town gardens at Durban and must have been introduced on the roots of the water-lily plants which have added beauty to this memorial. The introduction of *Physopsis africana*, a carrier of bilharzia, is similarly possible.

R. T. L.

Cawston (F. G.). **Some Notes on the Effect of Desiccation upon Molluscan Disease-Carriers.**—*Ann. Trop. Med. & Parasit.* 1927. Mar. 25. Vol. 21. No. 1. pp. 35–38. With 5 figs. on 1 plate. [2 refs.]

Cawston finds that the molluscan carriers of schistosomes and other flukes in South Africa resist drying for several hours at a time, and that they can be sent by post in a dry condition. The presence of air is more important than moisture.

T. W. M. C.

Bettencourt (A.) & Borges (I.). La bilharziose au Portugal. A propos du mémoire de P. Remlinger sur l' absence de la bilharziose à Tanger. [**Bilharziasis in Portugal. Its Absence from Tangier.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 350–364. With 9 figs. on 2 plates. [42 refs.]

The authors continue the discussion on the probable route by which *Schistosoma haematobium* has reached Portugal and draw attention to the coincidence of the relatively high temperature of the waters at the endemic foci throughout the year. This may have played an important part in the maintenance of these foci of infection, which are limited to three centres—Tavira, Alportel and Estoi in the ancient kingdom of Algarves.

R. T. L.

Emile-Weil (P.). Un cas parisien de splénomégalie bilharzienne d'origine martiniquaise. [**Case of Bilharzial Splenomegaly from Martinique.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1927. Mar. 24. Year 43. 3rd Ser. Vol. 51. No. 10. pp. 344–352. [6 refs.]

Emile-Weil records a case of splenomegaly due to *Schistosoma mansoni* in a young man who had contracted the infection in Martinique during childhood ; and he points out that this disease is not confined to Egypt.

R. T. L.

Lampe (P. H. J.). **The Development of *Schistosoma mansoni*.**—*Proc. Roy. Soc. Med.* 1927. July. Vol. 20. No. 9. pp. 1510–1516 (Sect. of Trop. Dis. & Parasit. pp. 56–62.) With 4 figs. [Military Hosp., Paramaribo, Dutch Guiana.]

Dr. Lampe finds *Planorbis guadeloupensis* as well as *P. olivaceus* naturally infected with *S. mansoni* in Surinam. Oral infection by the miracidium is considered to be the most frequent method of infection

of the snail. The number of cercariae discharged by an infected snail is estimated at 172,000, or 2,646 daily. The measurements of the cercariae of *S. mansoni* taken by the author do not agree with those of other observers. Cercariae enter incised skin more readily than normal. They do not make use of hair follicles or pores. In the light of his experiments the author is doubtful if skin penetration of the extremities is of common occurrence in man. Mucous membrane infection always produced good results. The author favours the direct passage of the cercaria from the lung through the visceral pleura and diaphragm to the liver.

R. T. L.

Porter (Annie). **Notes on the Structure and Life-History of a Variety of *Schistosoma spindalis* Montgomery observed in South Africa.**—*S. African Jl. of Sci.* 1926. Dec. Vol. 23. pp. 661–666. [2 refs.]

Two cases of human infestation with *Schistosoma spindalis* have been observed by the author in S. Africa. One was a European who had worked with cattle and goats in S.W. Africa, the other a young native cattle herd from Northern Transvaal in whose urine both *S. spindalis* and *S. haematobium* occurred. The paper contains detailed descriptions of the ova, miracidia, sporocysts and cercariae of *S. spindalis*. These developmental stages occur in *Planorbis pfeifferi* and *Isidora tropica*. Slight differences between the ova found in these cases and those found in Indian cattle are regarded as indicative of a distinct strain or race for which the name *S. spindalis* var. *africana* is suggested.

R. T. L.

Cawston (F. G.). **The Snail Host for Bilharzia in Zanzibar.**—*Jl. Trop. Med. & Hyg.* 1927. Aug. 15. Vol. 30. No. 16. p. 209.

Isidora (*Physopsis*) *ovoidea* Bt. is known only from Zanzibar. It may be distinct from *Isidora africana* (Krauss) and not merely a variety. The author surmises that it is the intermediary of *Schistosoma haematobium* in Zanzibar.

R. T. L.

Rizzo (Carlo). Il primo caso di bilharziosi intestinale osservato in Cirenaica. Contributo nosogeografico e clinico alla conoscenza delle Schistosomiasi umane. [**First Case of Intestinal Bilharziasis seen in Cirenaica.**]—*Riforma Med.* 1927. June 13. Vol. 43. No. 24. pp. 555–561. With 2 microphotographs & 1 map in text. [Numerous refs.]

This apparently autochthonous case of intestinal bilharziasis in Cirenaica was due to infection with *Schistosoma mansoni*.

R. T. L.

Miller, Jr. (Harry Milton). **Comparative Studies on Furcocercous Cercariae.**—*Illinois Biol. Monographs.* 1926. July. Vol. 10. No. 3. 112 pp. With 8 plates & 2 text figs.

Owing to the fact that the cercariae of the Schistosome worms possess a bifurcated tail, this zoological monograph is of interest to medical workers. Miller has considered all trematode larvae which are furcocercous, although

this larval character occurs in different groups. From a study of the parasites of North American molluscs the author has added seven new species to the list of North American furcocercous cercariae.

R. T. L.

Bremer (Karl). **Certain Aspects of Hydatid Disease.**—*Jl. Med. Assoc. S. Africa.* 1927. June 25. Vol. 1. No. 12. pp. 301–304.

In the Karroo the inhabitants depend chiefly upon the sheep industry for a living. Almost all the hydatid cases come from the sheep farms, and only a few occur in towns. Of 4,071 admissions to the Midland Hospital (Graaff-Reinet) 25, or 0·6 per cent., were for hydatid, while out of 660 major operations 23, or 3·5 per cent., were for hydatid cysts. It would seem, on a rough estimate, that about half per cent. of the population show signs of hydatid disease over a period of 20 years. Several clinically interesting cases are described.

R. T. L.

Africa (Candida M.) & Sta. Cruz (Juan Z.). *Cysticercus Cellulosae* **in Man.**—*Jl. Philippine Islands Med. Assoc.* 1927. June. Vol. 7. No. 6. pp. 209–215. [College of Med., Univ. of the Philippines.]

In the protocols of more than 12,000 autopsies performed in the Department of Pathology and Bacteriology in the University of the Philippines and covering a period of 19 years (1907–1926) only two cases of infestation of man with *Cysticercus cellulosae* are noted. The notes of these two cases are now printed. The authors state that a single case of cysticercosis was once encountered in a living subject in the Philippines. Among the Filipinos adult *T. solium* and *T. saginata* occur in the proportion of 1 to 7.

R. T. L.

Southwell (T.). **Experimental Infection of the Cat and the Fox with the Adult** *Echinococcus.*—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 155–163. [11 refs.]

Cases of infection with hydatid are much more common in man and domesticated animals in England than is generally recognized. At the same time the rarity of *Taenia echinococcus* in the dog has been remarked upon by various authorities. The author has shown that the fox and the cat can be infected experimentally with *T. echinococcus* by feeding these animals with hydatid cysts. The use of slaughter-house refuse on the land as manure may be a source of the infection in the fox.

R. T. L.

Rackemann (Francis M.) & Stevens (Amos H.). **Skin Tests to Extracts of Echinococcus and Ascaris.**—*Jl. Immunology.* 1927. June. Vol. 13. No. 6. pp. 389–394. [10 refs.] [Massachusetts General Hosp.]

The skin reaction to echinococcus fluid and to ascaris extract which occurs in patients who have recently suffered from the infections is

accompanied by "reagins" but not by "precipitins." Hypersensitiveness to ascaris is not uncommon and may be acute even in persons who give no indication of previous infection.

R. T. L.

Alcaraz (Ramón A.). La obtención de suero positivo Ghedini-Ymaz-Lorentz, en los animales de laboratorio. [**Obtainment of Positive Serum for Control in Hydatid Test.**]—*Semana Méd.* 1927. June 9. Vol. 34. No. 23 (1743). pp. 1428–1429.

It is often difficult to obtain when it is needed a positive serum as a control in testing a possible case for hydatid infection by the method of fixation of complement. The author found that inoculation of the fluid from hydatid of sheep intravenously into rabbits yielded a potent serum, having a higher antigenic power than human hydatid fluid.

H. Harold Scott.

King (G. E.). **Hydatid Disease.**—*China Med. Jl.* 1927. May. Vol. 41. No. 5. p. 457.

In view of the apparent rarity of Echinococcus infection in China these brief notes of operations on five cases of hydatid in man and the record of two other cases which refused operation are of interest.

R. T. L.

Magath (Thomas B.) & Brown (Philip W.). **Standardized Method of treating Tapeworm Infestations in Man to recover the Head.**—*Jl. Amer. Med. Assoc.* 1927. May 14. Vol. 88. No. 20. pp. 1548–1549. With 1 text fig. [1 ref.]

The procedure recommended is a combination of various methods and consists of three essential steps. The patient should not have luncheon or supper on the day preceding treatment, but black coffee or tea and water may be taken freely. 15–30 gm. of magnesium sulphate is administered at 6 p.m. and repeated at 6 a.m. After the bowels have moved and without being given breakfast the patient receives 30 cc. of an emulsion containing oleoresin of aspidium, 6 cc. or gm., powdered acacia 8 gm., distilled water to make 60 cc. One hour later a second 30 cc. of emulsion is administered. This is followed two hours later by 30 gm. of magnesium sulphate and two hours after this a large soap-suds enema is given. If the patient has been properly prepared the stool should consist of little but water, a few shreds of digested food and a worm. The authors regard the enema as an extremely important part of the treatment and point out that a saline purge is essential instead of castor oil as aspidium is highly toxic and soluble in oil.

R. T. L.

Isobe (Michi). **The Significance, Physicochemical Conditions and Pharmacological Studies on the Movement of the Hexacanth Embryo.**—*Acta Scholae Med. Univ. Imperialis in Kioto.* 1926. Vol. 8. No. 4. pp. 519–536. [5 refs.]

Grape sugar in 0·365 mol. solution and table salt in 0·172 mol. solution cause a vigorous motion in the Hexacanth embryo of Taenia, which, accompanied by extension and contraction of the body, may be sufficiently

violent to burst the shell. On the other hand magnesium sulphate, which is frequently employed clinically as purgative and given daily in doses of 15 gm., makes a solution of over 1·04 mol. which renders the hatching of the embryo impossible. Diluted hydrochloric acid in a 1 per cent. solution gives a concentration of 0·03 mol. and this too is against the mechanism of freeing the embryo. The author is strongly of the opinion that the administration of this kind of drug can prevent infestation by *Hymenolepis diminuta*.

R. T. L.

CHANDLER (Asa C.). **The Distribution of Hymenolepis Infections in India, with a Discussion of its Epidemiological Significance.**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 973–994. With 3 maps. [20 refs.]

By direct centrifugal flotation method Chandler has found *Hymenolepis nana* to be widespread in man in India. He discusses the epidemiological factors underlying the unequal distribution of *H. nana* infections as compared with the distribution of ascaris and whipworm in India. From an examination of 8,000 individuals from various parts of India he finds that in those localities where *H. nana* infections are rare or absent ascaris and whipworm infections are strikingly present. He points out that if *H. nana* in man were commonly derived from rats one would expect the infection to be common in all localities where plague is present ; to be rare in all localities where plague is not present on account of conditions which do not favour rats ; and to be common in localities where rats are numerous, though plague is rare on account of special climatic conditions adversely affecting growth of plague bacilli in fleas. He finds the distribution of *H. nana* infections so overwhelmingly close to that of plague that it is difficult to deny an underlying common epidemiological factor, which apparently is an abundance of rats in close association with man. He also points out that 19 out of 20 cases of *Hymenolepis diminuta* reported from man in India occur in areas where *H. nana* infection exceeds 3 per cent., while the one case came from an area where *H. nana* infections are below 1 per cent. This brings another epidemiological fact to support the theory of the rodent origin of *H. nana* infections in man.

R. T. L.

BRUNI (Enrico). La Tenia nana. I primi sette casi d'infestazione negli Abruzzi. [**Cases of** *Taenia nana* **Infestation in the Abruzzi.**]—*Ann. di Med. Nav. e Colon.* 1927. Mar.–Apr. Year 33 (Year 5). Vol. 1. No. 3–4. pp. 141–147. [57 refs.]

Between 1879 and 1923 the number of cases of *Taenia nana* infection recorded for Italy totalled 95. Of these 50 occurred in Sicily, 28 in Lombardy, 8 in Tuscany, 4 in Campania, 3 in Lazia, and 1 each in Venice and Piedmont. The author adds to these records seven cases of infestation in the Abruzzi, one of which he had published in 1923.

R. T. L.

JOYEUX (Ch.). *Diphyllobothrium mansoni* (Cobbold, 1883). (Note préliminaire). [*Diphyllobothrium mansoni.*]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 226–228.

Joyeux gives a preliminary account of the morphology of the adult of *Sparganum mansoni* and contrasts it with *D. reptans*, *D. decipiens* and *D. latum*. He believes it to be a valid species and promises a more detailed and illustrated account.

T. W. M. C.

Krause (Esther). Contribution à l'étude du *Diphyllobothrium latum* (L.) en Palestine. Description d'anomalies chez ce cestode. [*D. latum* **in Palestine. Anomalous Specimen.**]—*Ann. Parasit. Humaine et Comparée.* 1927. July 1. Vol. 5. No. 3. pp. 249–251. With 1 fig. [4 refs.]

A specimen of *Diphyllobothrium latum* showing in its whole length of 10 metres 37 segments with fenestration. One of the large fenestrations extends over three segments. In the lake of Tiberius *Perca fluviatilis* and *Barbus sp.* occur. These species are known vectors of *D. latum*.

R. T. L.

Carman (J. A.) **A Case of Acute Intestinal Obstruction due to Taeniasis.**—*Kenya & East African Med. Jl.* 1927. Aug. Vol. 4. No. 5. pp. 152–153.

Until 16 hours before death from intestinal obstruction due to taeniasis practically no symptoms were noticed. At the post-mortem 7 tapeworms were found aggregating over 100 feet in length.

R. T. L.

Hoeppli (R.). Ueber Beziehungen zwischen dem biologischen Verhalten parasitischer Nematoden und histologischen Reaktionen des Wirbeltierkörpers. [**Relations between the Biological Behaviour of Parasitic Nematodes and the Tissue Reactions of the Host.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Vol. 31. No. 3. pp. 207–290. With 24 figs. & 1 coloured plate.

The subject of this monograph is the investigation into the relations between the structure and mode of life of parasitic nematodes on the one hand, and the histological reactions on the part of the host on the other. Such records are scarce and for their accuracy depend very largely on the material being fixed as soon as possible after death; this the author was fortunate in being able to obtain.

The work is divided into four sections: In the first are considered the modes of attachment of various parasitic nematodes and the reaction by the hosts' tissues; in the second the tissue-changes set up by the manner in which the parasite acquires its nutriment; in the third, the histological reactions to wandering nematodes; and, lastly, the reaction to encapsulation.

The author shows, with illustrative examples, how the mode of attachment varies with the structure and form of the head. Nematodes which pass their adult life entirely within the body-tissues have but little need of organs of attachment; these are consequently absent or lowly developed, for instance in Filariae. Those which lie free, partly or wholly, behave differently according to their environment. When the space at the disposal of the parasite is so adapted that it can by its length and bodily formation gain attachment, a highly developed fixing apparatus is not present, as in *Rhabdias bufonis* and *Ascaris lumbricoides*. In 350 autopsies in man ascaris was always found lying free in the intestine; this does not necessarily prove that there was no attachment in life, but no signs were found of any wounds of the mucosa when the tissues were examined microscopically. The same remark applies to *Parascaris equorum*. With *Contracaecum* and *Anisakis*

a crateriform dip was found in the mucosa and the base comprised a small necrotic area with surrounding eosinophilia ; with *Tanqua tiara* the site of pressure was indented with pectinate markings, corresponding with the cuticular rings on the head of the worm, by which the parasite, as it were, anchored itself to the mucous membrane. *Porrocaecum* was found to penetrate deeply (in an American robin, *Turdus migratorius*) even to the serous coat. The canal contained torn off epithelial cells, singly or in groups, but there was no necrosis of the wall nor any inflammatory reaction. The deduction from this is that the penetration is probably a post-mortem feature, the worm burrowing more deeply as the bird's temperature fell after death.

In the case of *Tanqua tiara* the head is bulb-shaped and is seen to occupy a cavity having a narrowed outlet closely approximated to the pectinate tissue of the posterior part of the head, which is held in a sort of ball-and-socket joint, and the tissue adjacent at the summit of the head is necrotic. *Gnathostoma hispidum* showed a similar mode of attachment in the stomach of the pig. With some forms of *Physaloptera* the mucosa was indented and the surrounding tissue was oedematous, but there was no infiltration of it nor any necrosis ; *Physaloptera turgida,* however, adhered more firmly, biting out sharply circumscribed fragments from the mucosa or gnawing away the superficial layers. Some worms, such as the Trichuroidea, have a long and narrow anterior end, suited for boring, and the whole acts as an attaching structure ; others have a definite fixation-apparatus, as *Ancylostoma duodenale* and *Tanqua tiara.*

The effect of attachment is in part purely mechanical, though this may lead to reaction by the tissues of the host, as in *Gongylonema scutatum* in the oesophageal mucosa of the ox, and *Trichosoma* in the urinary bladder of the rat, and in part the result of chemicotoxic action by special secretions. One of the effects of the latter is a localized eosinophilia. This phenomenon depends on four factors : 1. The species of parasites ; 2. The species of the host ; 3. The nature of the host's tissues ; 4. The virulence and duration of infection. It would appear that eosinophiles possess the property of taking up and destroying toxic substances.

Passing on to the question of the mode of obtaining nutriment. Some nematodes, e.g., *A. duodenale,* bite or tear off single cells or clumps of them, and thus obtain blood also ; others, such as *Trichuris trichiura* reduce the adjacent tissue-cells to a fluid state and then absorb a more or less homogeneous material ; *Contracaecum* and *Tanqua* employ both a mechanical action on the tissues and the effect of secreted substances, while *Rhabdias bufonis* is almost entirely a blood-sucker. Some, again, take up tissue-fluids or serum, with or without cells, a process analogous to osmosis, e.g., *Filariae*; while, finally, some obtain their nutriment from the intestinal contents of the host.

The reaction of the tissues to the wandering nematodes is the subject of an interesting section, illustrated by microphotographs of the changes induced. These changes are shown to be dual in nature, namely those resulting from the presence of the parasite as a mere foreign body, and those due to secretory products. The former has a considerable variation, for example, the presence of Ascaris larvae. These wander in the rabbit and the mouse as in man, but, in the liver of the rabbit little harm results, whereas in the mouse, with its smaller vessels, there is more or less destruction of the whole organ from blocking and rupture of vessels.

The final section on the histological changes resulting from encapsulation of nematodes consists of two parts ; in the first those are dealt with which encyst in the mature, adult, stage, such as *Onchocerca volvulus, Spirocerca sanguinolenta, Habronema megastoma, Hepaticola hepatica,* and others ; in the second the encapsulaton of larvae is described, as those of *Toxacara canis, Strongylus vulgaris, Trichinella spiralis.*

Want of space precludes us from giving details of this last section, which is important and instructive. The whole monograph is of the utmost

interest from the point of view of comparative pathology, and the collection of facts is of the nature of pioneer work on the borders of a vast and little explored domain.

H. Harold Scott.

Fülleborn (F.). Ueber das Verhalten der Larven von *Strongyloides stercoralis*, Hakenwürmern und *Ascaris lumbricoides* im Körper des Wirtes und ein Versuch, es biologisch zu deuten. [**Behaviour of Larvae of** *S. stercoralis*, **Hookworms and** *A. lumbricoides* **in the Host's Body. A Biological Explanation.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Vol. 31. No. 2. 56 pp. With 5 text figs. [39 refs.]

In a characteristicly detailed study, full of suggestive ideas, Professor Fülleborn has communicated his continued studies on the biology of the larvae of Strongyloides, hookworms and ascarids.

He finds that in the case of the larva of Strongyloides, its sojourn in the tissues of the host—whether under the skin or in the walls of the intestine—causes changes which are essential for its future and continued development.

Larvae of the dog hookworm (*Uncinaria stenocephala*) when fed to the proper host can penetrate into the ducts of the intestinal glands (as can also the larvae of the dog whipworm and of *Heterakis gallinae* of birds) from which, after some time, they re-emerge into the lumen of the alimentary canal to continue their development. After penetration of the skin, important morphological changes may occur in the lungs—development continuing as far as the formation of the provisional buccal capsule characteristic of the last larval stage and the formation of the new skin.

Fülleborn considers that the invasion of the glands in direct feeding may be a " philogenetic reminiscence " of a sojourn in the tissues which was an essential stage in the life history of some previous ancestor ; alternatively of an obligatory migration from the alimentary canal to the lungs. The continued development observed in the lungs following skin penetration supports the latter hypothesis. In abnormal hosts development does not proceed as far as the development of the provisional buccal capsule and only some of the larvae leave the intestine to complete the lung circuit.

He believes that the reason why the larvae of *Ascaris lumbricoides*, after feeding, cannot settle down in the gut, is because this species originally required an intermediate host (as is the case with the fish Ascarids) and that later the definitive host became the intermediate host as well—a form of development observed in other species of helminths. In order to reach the internal organs of the intermediate host, penetration of either the skin or gut wall is necessary. All larvae in the circulation must, from purely mechanical causes, reach the lungs and can be carried from there by the ciliated epithelium of the air passages to the oesophagus. The definitive host could accordingly be infected not only by larvae which had penetrated its own intestine and been transferred to the lungs, but also by eating an animal containing the corresponding stages of the larvae in its lungs. Similarly one of the many intermediate hosts of *Ascaris lumbricoides* might possibly have become a definitive host, the only possible method in non-flesh-eating hosts.

T. W. M. C.

Branch (Arnold) & Gay (D. M.). **Diarrhea in Monkeys** (*Macacus rhesus*) **with Oesophagostomum, Strongyloides and Trichomonas Infections.**—*Amer. Jl. Trop. Med.* 1927. Mar. Vol. 7. No. 2. pp. 97–110. • With 6 text figs. [5 refs.]

Branch and Gay examined a batch of 45 monkeys (*Macacus rhesus*) suffering from a severe form of diarrhoea from which 20 died. Post-mortem examinations disclosed a mucous enterocolitis due apparently to *Oesophagostomum brumpti* and possibly aggravated by the presence of *Strongyloides fülleborni*. Lung lesions due to Ascarids were common. No therapeutic measures were found to be very effective, but transference to large sanitary cages which could easily be cleaned caused a striking change as re-infection from faeces had apparently been common.

T. W. M. C.

Connor (Frank). **A Plea for a Thorough Investigation of the Filariasis Problem.**—*Indian Med. Gaz.* 1927. May. Vol. 62. No. 5. pp. 239–240.

Sir Frank Connor makes a strong plea for a full investigation of the problems associated with filarial infection in India. He lists the many apparent gaps in our knowledge and points out that the mortality from filariasis, though seldom direct, is probably enormous. Moreover, clinical evidence proves that the sick-rate involved, and therefore the industrial loss, is very high.

R. T. L.

Yamada (Shin-Ichiro) & Komori (Kamewe). **From what Point of the Proboscis of the Mosquito do Developed Larvae of** *Filaria bancrofti* **escape?**—*Scientific Reports Govt. Inst. Infect. Dis. Tokyo.* 1926. Vol. 5. pp. 647–651. With 4 figs. on 1 plate. [9 refs.]

The authors have had no opportunity of observing the escape of filarial larvae from mosquitoes in the natural condition, but they have studied experimentally the escape of developed filarial larvae from the labium by rupturing the tip of the labella when a certain stimulus, such as pressure or heat, is experimentally given to them. They may also escape spontaneously in the same way when their hosts are fed on sugar solution. The tip of the labella lies just ahead of the path of the larvae and is easily ruptured by light pressure from outside or from within. In no case did they find filarial larvae escaping through Dutton's membrane.

R. T. L.

Dalal (Chimanlal M.). **The Treatment of Filarial Fever by Neosalvarsan.**—*Indian Med. Gaz.* 1927. Aug. Vol. 62. No. 8. pp. 449–450.

Dalal has treated three patients suffering from filarial fever with injections of 0·6 gm. of neosalvarsan with encouraging results. After a single injection, each of the three cases became free from fever. The swelling of the glands, although somewhat reduced, persisted and the author inquires as to the best measures for treatment as to these swellings.

R. T. L.

Khan (Kishori Mohan). **A Fatal Case associated with Filarial Infection.**—*Indian Med. Gaz.* 1927. Mar. Vol. 62. No. 3. p. 147.

Khan records a fatal case in an adult male suggesting a septicaemia secondary to a filarial infection, but as no post-mortem examination took place the diagnosis was not confirmed. There were no symptoms other than fever (106·8° F.) but microfilariae were found in the blood.

R. T. L.

Low (George C.). **Loa Loa Infection in Central Equatorial Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 514–515. With 1 map in text.

This note gives a useful map of Africa showing three foci of *Loa loa* infection in the Haut Wellé and Ituri Provinces of the Belgian Congo. Mr. James Taylor, of the Heart of Africa Mission, is reported to have written to the effect that many cases occur among both whites and blacks at the Mission Stations of Niangara, Nala and Ibambi.

R. T. L.

Sharp (N. A. Dyce). **Development of *Microfilaria perstans* in *Culicoides grahami*; a Preliminary Note.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. July 11. Vol. 21. No. 1. p. 70.

The embryos of *Filaria perstans* ingested by *Culicoides grahami* undergo metamorphosis in the usual filaria manner up to the sausage-shaped body in the thoracic muscles. The completely metamorphosed larvae emerge from the neck of the fly later. About 3 per cent. of the wild flies are naturally infected at Mamfe, British Cameroons.

R. T. L.

Itagaki (Shiro) & Makino (Rokuro). **Studies on the Treatment of *Microfilaria immitis* Infection by Intravenous Injection of Natrium Antimonyl Tartarate.**—*Jl. Japan Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. English summary pp. 15–23. [In Japanese pp. 1–14. 9 refs.]

The intravenous injection of natrium antimonyl tartrate is claimed by the authors to have given satisfactory results by causing the disappearance of microfilaria from the peripheral blood of 17 dogs upon which it was tested. Nevertheless living adult worms were found after death. The drug appears also to have caused toxic symptoms in most cases.

R. T. L.

Sharp (N. A. Dyce). **Onchocerciasis.**—*Proc. Roy. Soc. Med.* 1927. Apr. Vol. 20. No. 6. pp. 927–937 (Sect. of Trop. Dis. & Parasit. pp. 41–51).

Although *Onchocerca volvulus* is commonly associated with tumours these are not essential and are only to be regarded as late manifestations of infection. The first sign of the disease is not a subcutaneous tumour but the existence of active embryos in and around the corium. At Kaduna, Northern Nigeria, the author found skin infection in 55 per cent., but tumours only in 30 per cent. The embryos are commonly found in the lymphatic glands, sometimes in enormous numbers. In the blood of 2,000 cases examined by thick film method, embryos occurred in 8 per cent. In hydrocele fluid they are often present. Tumours may simulate juxta-articular nodules, which the author

declines to believe form a clinical entity and regards as the aftermath of a fibrous tumour caused by Onchocerca, spirochaetes or other organisms as a result of slight but prolonged irritation of the subcutaneous fascia. The author confirms Ouzilleau in his association of Onchocerca with cases of elephantiasis. It is stated that a successful result followed the intravenous injection of a gold preparation B 1916 in a single case.

R. T. L.

Bhachech (Pramodrai Motilal). **Guinea-Worm Infection ; a Personal Experience.**—*Indian Med. Gaz.* 1927. Aug. Vol. 62. No. 8. p. 450.

The author relates his personal experience of infection with guinea-worm. Two parasites appeared in the right lower extremity in 1908, and came out in pieces. In 1912 he removed an entire worm measuring $2\frac{1}{2}$ feet from the left leg. Fifteen years later a worm appeared at the inner canthus of the left eye. After some days the worm began to extrude itself from near the supra-orbital foramen. This parasite was a small one, and only 3 inches in length ; its appearance was not heralded by urticaria or fever as in the two previous instances.

R. T. L.

Cazanove (F.). Considérations sur la dracunculose et la filariose. [**Notes on Dracontiasis and Filariasis.**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 445–447.

The author has enquired into the histories of 469 soldiers in the 1st Senegalese Battalion of Algeria and finds 120 of them had had guineaworm. He concludes from a study of the geographical distribution of the cases that the lakes of the desert region are special centres of infection, and thinks that infection through the skin is the most plausible route. There are similarly distinct endemic foci for *Filaria bancrofti* which may be attributable to a special species of mosquito as the only efficient carrier in these regions.

R. T. L.

Kuruhashi (Tadashi). [**On a Case of** *Filaria medinensis* **occurring in Korea.**]—*Chosen Igakkwai Zasshi* (*Jl. Chosen Med. Soc.*). 1926. Oct. No. 68. [Summarized in *Japan Med. World.* 1927. May 15. Vol. 7. No. 5. pp. 145–146.]

A guineaworm about 200 millimetres long was removed from a patient from the city of Fusan in Korea. The patient also removed another worm from his foot. No similar case has been reported from this region.

R. T. L.

Chaigneau (Y.). Sur le traitement de la dracunculose par la méthode de Tournier. [**Treatment of Dracontiasis by Tournier's Method.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 395–397. [1 ref.]

Five cases of dracontiasis treated by the native method of slow extraction required 20–87 days to cure, while in 17 cases treated by Tournier's method with kermès the parasites were expelled in from 1 to 13 days.

R. T. L.

Staffieri (David), Giacosa (Ramón A.) & Barralt (Rómulo). La anguillulosis intestinal activa y latente. Consideraciones a propósito de tres nuevas observaciones. [**Strongyloidosis, Active and Latent. Three Fresh Cases.**] —*Semana Méd.* 1927. May 19. Vol. 34. No. 20 (1740). pp. 1212–1217. With 2 text figs.

The development of Strongyloides in the intestine is generally associated with an intense enteritis and may give rise to marked anaemia and occasionally fever. The author gives clinical observations on two cases of this infection.

R. T. L.

Manalang (C.). **Observations on the Development of Ascaris Ova.**— *Philippine Jl. Sci.* 1927. July. Vol. 33. No. 3. pp. 249–255. [4 refs.]

Under experimental conditions the ova of *Ascaris lumbricoides* develop into motile larvae in from 9–15 days at room temperature. A temperature of 55° C. appears to prevent larval development. When dried on a glass slide and exposed to direct sunlight the ova failed to develop. When suspended in Kronecker fluid in a moist chamber and exposed to direct sunlight for 2 hours and longer, the ova showed no subsequent development. Kept for more than two weeks in a desiccator the ova showed attempts to larvate but did not become motile larvae. Anaerobic conditions appear to delay but not to inhibit development. The impermeability of the eggshell to high concentrations of salt, vinegar and sugar and various other substances is demonstrated by the author's experiments. The marked resistance of ascaris eggs to chemical substances seems to indicate that the most practical methods of prevention lie in proper sewage disposal and the periodic treatment of infected cases.

R. T. L.

Schwenck (J.). Rôle des cloportes en tant que porteurs d'oeufs de nématodes. [**Wood Lice as Carriers of Nematode Ova.**]—*C. R. Soc. Biol.* 1927. Aug. 26. Vol. 97. No. 25. pp. 848–850.

In studying the parasitic fauna of wood-lice the author has frequently found bodies resembling the eggs of Toxocara. This led him to feed wood-lice experimentally on the dejecta of cats infested with round-worm. The experiments were repeated with human stool containing eggs of *Ascaris lumbricoides*. In both cases the faeces of the wood-lice contained viable eggs. A more detailed account of the investigation is promised.

R. T. L.

Koidzumi (Makoto). **A Résumé of Works on Ascaris recently published from the Parasitology Laboratory, Keio University Medical College.**— *Japan Med. World.* 1927. Jan. 15. Vol. 7. No. 1. pp. 12–16.

In a survey of the work on Ascaris done by his colleagues, Koidzumi draws attention to Hiraishi's experiments in which he demonstrated that in the absence of vitamin A from the diet it was easy to infect pigs with both porcine and human strains of Ascaris, although the latter were never so plentiful as the former. Pigs fed on the same diet to which cod-liver oil had been added could not be infected.

Experimental studies on the pathogenesis of Ascaris infections showed that the products excreted by the worms kept in Ringer's solution caused a degeneration in the suprarenal glands. The coelomic fluid of the worm contains a substance which causes a lowering of the blood pressure, quickening of the heart and contraction of smooth muscle fibres. The changes in the suprarenals may be due to the lowering of the blood pressure.

He draws attention to the fact that the lung migrations of the worms may predispose to tuberculosis although the available experimental evidence does not support this belief.

T. W. M. C.

Hiraishi (Teiichi). [**Experimental Ascariasis of the Young Pigs with Special Reference to A-Avitaminosis.**] *Kei-o Igaku (Jl. Kei-o Med. Soc.)* 1926. July. Vol. 6. No. 7. [Summarized in *Japan Med. World.* 1927. Mar. 15. Vol. 7. No. 3. pp. 79–80.]

Hiraishi attempted to infect young pigs experimentally with ascaris. Out of 30 only 1 gave a positive result. He then tried animals with A-avitaminosis and obtained 89 per cent. and 100 per cent. in two series of experiments.

R. T. L.

Brown (Harold W.). **Human Ascaris as a Household Infection.**—*Jl. Parasit.* 1927. Mar. Vol. 13. No. 3. pp. 206–212. [7 refs.]

Ascaris ova have been found in a high percentage of the floors of huts and about the door yards in Penonomé, in the Republic of Panama, where human excrement is not used as a crop fertilizer and the sources of drinking water are apparently free from faecal pollution. Ascaris incidence in rural Panama varies from 40-90 per cent. of the population. Oxyuris ova were also isolated from the floor of one hut in which a child infested with this parasite was living.

R. T. L.

Walker (J. H. C.). *Ascaris lumbricoides* **in the Singapore Garrison.**—*Jl. Roy. Army Med. Corps.* 1927. July. Vol. 49. No. 1. pp. 49–53.

The Singapore garrison was found to be heavily infested with parasitic worms, chiefly *Ascaris lumbricoides*. In one battalion the incidence was 84·71 per cent. This high degree of infection was traced to the supply of uncooked vegetables, principally lettuce and spring onions, from local market gardens owned and managed by Chinese. Although the use of human nightsoil is forbidden by law it has proved very difficult to prevent. The faeces so used is generally stored for three weeks. This probably destroys the more delicate ova and cysts and gives the ascaris ova time to become mature. The paper concludes with clinical notes of the two worst cases of worm infection seen by Sir David Galloway during thirty years' experience in Singapore.

R. T. L.

AUGUSTINE (Donald L.). **Development in Prenatal Infestation of** *Belascaris.*—*Jl. Parasit.* 1927. June. Vol. 13. No. 4. pp. 256–259. [5 refs.] [Med. School & School of Pub. Health, Harvard.]

The development in the foetus of *Belascaris marginata* larvae in prenatal infestations is retarded until parturition, after which migration takes place from the liver and lungs to the intestines, where the adult stage is reached. The author's experiments suggest also an age immunity, and as *B. marginata* is considered a parasite of young dogs it is probable that the age of the bitch may be a factor in determining the number of worms in the new born litter.

R. T. L.

PAWAN (J. L.). **Another Case of Infection with** *Lagocheilascaris minor* **(Leiper).**—*Ann. Trop. Med. & Parasit.* 1927. Mar. 25. Vol. 21. No. 1. pp. 45–46. With 2 figs. on 1 plate. [1 ref.]

The patient, aged 19, had never left Trinidad. Eight years ago, an abcess developed on his neck and since then it had continued to discharge, healing in one part and breaking down in another with sinuses from which worms escape indistinguishable from specimens previously identified by LEIPER as *Lagocheilascaris minor.*

T. W. M. C.

LUDLOW (A. I.). **Surgical Aspects of** *Ascaris lumbricoides.*—*China Med. Jl.* 1927. Feb. Vol. 41. No. 2. pp. 134–141. [32 refs.]

Ascaris lumbricoides is one of the commonest parasites of man in Korea. The incidence in women is higher than in men, due probably to greater ignorance of hygienic matters and less medical attention rather than to greater exposure to infection. Different occupations show much uniformity in degree of infestation. This is due to the equal exposure to infection from : (1) the use of excreta of human and swine origin for fertilizer ; (2) the faecal contamination of : (*a*) vegetables, (*b*) of water, (*c*) of the hands and feet ; (3) the spread by insects and animals. In infections with the adult worm there may be many symptoms which simulate various surgical lesions, and unless there is some great contra-indication the author gives calomel and santonin as a routine to all surgical patients. Three illustrative cases are reported. The first was one of ileus, apparently caused by the irritant action of the Ascaris rather than by mechanical occlusion. The second was a case of intra-peritoneal abscess with the post-operative appearance of Ascaris through the drainage wound. In the third case there was general peritonitis with perforation of the ileum. During the year April, 1925–26, 207 of the 454 surgical patients treated in Severance Hospital, Seoul, were infected with Ascaris. Three cases of appendicitis, two of abdominal wall abscess with perforation at the umbilicus, all in children, and one case of Ascaris in a gall stone were observed. The author cautions that while ascariasis may resemble appendicitis, abdominal tuberculosis and post-operative peritonitis, serious lesions may be attributed to the parasite which in reality are due to other causes.

R. T. L.

Finaly (Rudolf). Over de beteekenis der ascariden voor de darmperforaties. [**Significance of Ascarids in Intestinal Perforation.**]—*Nederl. Tijdschr. v. Geneesk.* 1927. Aug. 6. 71st Year. 2nd Half, No. 6. pp. 598–602. [9 refs.] [St. Josef Hosp., Heerlen.]

Finaly quotes two cases in which an adult dead ascaris was found by operation, in a retroperitoneal sub-hepatic abscess and in the peritoneal cavity. Though no perforation of the intestine was found and no fistula followed the operation the author thinks that in both cases the worm must have perforated the healthy intestinal wall with subsequent healing of the minute perforation. The infectious material carried by the worm caused purulent infection in both cases, which probably brought about the death of the worm.

The transmigration of the human body by the larvae cannot afford the explanation, chiefly because the return to the intestinal tract is necessary for the further development of the larva (Fülleborn).

W. J. Bais.

Kanagarayer (K.). **Some Unusual Manifestations of Infection with** *Ascaris lumbricoides*.—*Malayan Med. Jl.* 1927. Mar. Vol. 2. No. 1. pp. 23–24.

On six occasions the author has found at autopsy Ascaris worms in abnormal situations. In one, a fatal case of amoebic dysentery the worm was in the peritoneal cavity, having apparently escaped through a perforated amoebic ulcer. In two instances the worms were found within the appendix; in two cases within the common duct, causing intense jaundice; and in one case within the pleural cavity, following a stab wound which perforated pleura, diaphragm and stomach. Ascariasis in the Tropics may closely simulate meningitis, cerebral malaria and abdominal tuberculosis and is recognized by most practitioners as a common source of fever.

R. T. L.

Barooa (M.). **Two Cases of** *Ascaris lumbricoides* **Infection simulating Cholera.**—*Indian Med. Gaz.* 1927. July. Vol. 62. No. 7. p. 388.

Two cases with symptoms of choleraic diarrhoea were cured by santonin, which resulted in the evacuation of Ascaris.

R. T. L.

Banerji (B. P.). **A Case of "Typho-Lumbricosis."**—*Indian Med. Gaz.* 1927. Mar. Vol. 62. No. 3. pp. 146–147.

Banerji records the case of a child of four, which displayed symptoms closely simulating typhoid fever. There was no rise in temperature, however, and after the expulsion of six ascarids, recovery took place.

R. T. L.

Akagi (Katsuo). [**On the Placental Infection of Ascaris.**]—*Chugai Iji-Shimpo* (*Internat. Med. Jl.*) 1926. Oct. Vol. 45. No. 20. [Summarized in *Japan Med. World.* 1927. Feb. 15. Vol. 7. No. 2. p. 46.]

Foetal infection by Ascaris and Ancylostoma has been experimentally proved to take place through the placenta. The infecting larvae were found wedged in the tissues of the foetal liver and lungs for a considerable period. After birth and the establishment of respiration the larvae migrate to other organs via the respiratory tract. The worms attain maturity within 21–25 days after birth of the host. The liver and lungs show simple haemorrhagic spots and cell infiltration.

R. T. L.

Hirai (Masamoto). [**On the Numerical Relation between the Passed Eggs and the Number of the Infesting Worms in Ascariasis and Ancylostomiasis together with a Notice on the Method of Counting Parasites' Eggs.**]—*Kei-O Igaku (Jl. Kei-o Med. Soc.)* 1926. Aug. Vol. 6. No. 8. [Summarized in *Japan Med. World.* 1927. Mar. 15. Vol. 7. No. 3. pp. 80–81.]

Hirai has calculated that the approximate number of ascaris might be estimated from the following formula :—

$$\frac{\text{eggs per milligram} \times 100}{2770} = \text{No. of females and}$$

$$\text{No. of females} \times \frac{4{\cdot}5}{5{\cdot}5} = \text{No. of males.}$$

R. T. L.

da Costa (S. F. Gomes). De l'action de l'oxycamphre, de l'acide camphorique et de l'oxime du camphre sur les helminthes. [**Action of Camphor Derivatives on Helminths.**]—*C.R. Soc. Biol.* 1927. Apr. 1. Vol. 96. No. 12. pp. 883–885. [12 refs.]

Da Costa, continuing his *in vitro* experiments on Ascaris, finds that these three camphor derivatives are much less active than camphor. Oxycamphor is the most active and camphoric acid the least.

T. W. M. C.

del Duca (Domenico). Santonina e Chenopodio. [**Santonin and Chenopodium.**]—*Policlinico.* Sez. Prat. 1927. June 27. Vol. 34. No. 26. pp. 925–926. [4 refs.]

The author gives a brief account of a child of 2½ years harbouring ascaris. He first gave santonin, 0·025 gm. with calomel and scammony, without any vermifugal effect. The child was very ill, apparently moribund. Coffee and oil of chenopodium [dose not stated] were given ; 348 worms were expelled and the patient rapidly recovered.

H. Harold Scott.

Kohgame (Yoshiki) & Asada (Junichi). [**A Study on the Nature of Ascaricidal Property of Santonin. Communication II.**]—*Tokyo Iji-Shinshi (Tokyo Med. News).* 1926. Dec. No. 2501. [Summarized in *Japan Med. World.* 1927. Apr. 15. Vol. 7. No. 4. p. 115.]

The ascaricidal power of santonin is due to its combination with bile, for santonin and metabolic products of santonin have no lethal action. Normal bile has a certain ascaricidal power, but not so remarkable as santonin-bile. Santonin is ineffectual against ascaris in organs other than the intestine. The drug can be absorbed from the vagina and exercise ascaricidal action.

R. T. L.

Sasaki (Ryudo). [**On the Oscillation of Specific Gravity of the Ascaris Eggs which are Manifested by their Growth.**]—*Tokyo Iji-Shinshi (Tokyo Med. News).* 1926. Dec. No. 2502. [Summarized in *Japan Med. World.* 1927. Apr. 15. Vol. 7. No. 4. p. 115.]

By Baume's scale the specific gravity of Ascaris eggs varied between 11·1 and 22·2. The less mature the eggs the heavier they were. Unfertilized were lighter than fertilized eggs.

R. T. L.

Fernán-Núñez (M.). **The Pathogenic Rôle of** *Trichocephalus dispar* (*Trichuris Trichiura*).—*Arch. Intern. Med.* 1927. July 15. Vol. 40. No. 1. pp. 46–57. [11 refs.] [Faculty of Med., Univ. of Madrid.]

In 90 per cent. of 512 patients who had whipworm eggs in their faeces there was a definite eosinophilia of more than 4 per cent. and averaging about 12 per cent. In 10 out of 16 autopsies on labourers dying from various causes in Colombia whipworms were present in the caecum and in two cases in the appendix. Ten out of 100 reported cases of appendicitis were due to infection with whipworm alone. In the Magdalena river valley of Colombia 41 per cent. of 1,336 persons examined harboured whipworm. Approximately 30 per cent. of cases commonly diagnosed in tropical America as amoebic dysentery are of whipworm origin. Purpura haemorrhagica, acrocyanosis dystrophica, pernicious anaemia, urticaria and goitre may be associated with infestation. As whipworm is associated with hookworm in 33 per cent. of all cases in the tropics and as hookworm treatment is often ineffective against whipworm the campaigns against hookworm cannot be considered entirely effectual unless attention is given to the elimination of whipworm.

R. T. L.

Lieb (Clarence W.). **The Successful Treatment of Resistant Whipworm Infestation with Observations on Overlooked Symptoms.**—*Amer. Jl. Med. Sci.* 1927. Apr. Vol. 173. No. 4. pp. 523–526. [2 refs.]

In eleven cases of whipworm infection studied, the author observed that nervous symptoms were common to all. In seven urticaria had occurred, two showed a curious erythema on face and chest and all exhibited marked pallor. There was marked tympany in most instances and caecal splash in every case. The author found whipworm eggs easily in 9 cases, but in the remaining 2 only after repeated examination by Barber's glycerine salt method. He gives an elaborate technique for treatment, 2 oz. of castor oil followed on four successive days by an enema of 2 litres of 5 per cent. solution of monohydrated sodium carbonate with 1 oz. of colloidal kaolin. One-ounce doses of kaolin are also given once daily on each of the four days. This is discontinued after the fourth day but the enema is continued for two days or more. After complete expulsion of the enema 8 oz. of crude oil are injected into the rectum.

R. T. L.

Ogata (Seiji). [**On the Destruction of Trichocephalus Ova by Heat.**]—*Chugai Iji-Shimpo* (*Internat. Med. Jl.*) 1926. Oct. Vol. 45. No. 19. [Summarized in *Japan Med. World.* 1927. Feb. 15. Vol. 7. No. 2. pp. 45–46.]

A temperature of 70° C. for one second, or 60° C. for two seconds, or 69° C. for ten seconds, or 55° C. for three minutes completely destroys the vitality of whipworm eggs. They can withstand a temperature of 45° C. for one hour.

R. T. L.

Dingmann (Albert). Zur Behandlung der Oxyuriasis in der Kinderpraxis. [**Treatment of Oxyuriasis in Children.**]—*Deut. Med. Woch.* 1927. Apr. 8. Vol. 53. No. 15. p. 621.

Dingmann recommends "with absolute confidence" the use of *Galonida Aluminii subacetici Nr.* 1. in the treatment of oxyuriasis in children.

R. T. L.

Chandler (Asa C.). **The Prevalence and Epidemiology of Hookworm and other Helminthic Infections in India. Part IX. North-West India (Punjab, Kashmir, Rajputana, North-West Frontier Province, Baluchistan and Sind).**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 955–972. With 1 map. [4 refs.]

A fairly high incidence of light infections with hookworm occurs along the north and east borders of the Punjab and a still lighter infection in the irrigated valley of the N.W. Frontier Province. Elsewhere throughout N.W. India the ordinary rural population is almost entirely free from hookworm infection. This is apparently due to the dryness of the climate. Ascaris and whipworm are also almost entirely absent, which suggests that these eggs are less resistant to heat and desiccation than is commonly believed. No less than one per cent. of the total population of this region appears to be infected with Trichostrongylus sp. Guinea worm is everywhere locally dependent on the presence of step wells or rain-water reservoirs ("tanks"). *Hymenolepis nana* is surprisingly common; the incidence varies in different localities from 1·21 per cent. and is strikingly similar to the incidence of plague. It is pointed out that the increase of irrigation may enhance hookworm infection, which is everywhere practically negligible at the present time, but the preference of the people for dry places for defaecation makes it improbable that hookworm will become a serious disease in this region. He concludes by stating that education on the importance of protecting food from rodents would assist in reducing *H. nana* infections.

R. T. L.

Chandler (Asa C.). **The Prevalence and Epidemiology of Hookworm and other Helminthic Infections in India. Part X. Central India and Bombay (Central Provinces, Central India Agency and Gwalior, Bombay Presidency except Sind and Hyderabad). Part XI. Madras Presidency and Southern States.** *Indian Jl. Med. Res.* 1927. July. Vol. 15. No. 1. pp. 143–158. With 1 map. [4 refs.]; pp. 159–180. With 1 map. [3 refs.]

There is a small area in the eastern part of the Central Provinces of India which has a moderate degree of infection with hookworm. In the southern part of the Konkan district of Bombay the infection is fairly high, but throughout the greater part of Central India and Bombay it is extremely low owing to climatic conditions, for the rainfall is too low and uncertain to permit infection to spread appreciably. Indiscriminate soil pollution is practically universal. The nature of the soil exercises a marked influence on the amount of infection. The black cotton soil of a large part of Central India is particularly unfavourable for hookworm larvae. Except on the southern Bombay coast ascaris and whipworm infections are also negligible. Guineaworm is locally common where step wells are used, especially in the Western States of

the Central Indian Agency and in the Gujerat and Deccan division of Bombay. Sporadic cases of Trichostrongylus occur everywhere, as in other parts of India. A rhabditis-like egg was found in the stool in a case near Tharwar, but is not *Rhabditis hominis*. Heterodera eggs were found in many places, especially in Bombay.

R. T. L.

Fischer (W. O.) & Orenstein (A. J.). **Preliminary Report on Hookworm Infection in the Gold Mines of the Witwatersrand.**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1927. Feb. Vol. 6. No. 7. pp. 1–10. With 3 plans.

Recent investigations have shown that hookworms are an important factor in mining, and the authors, after a review of the parasites, their prophylaxis and their therapeutics, consider the position in the Witwatersrand Gold Mines. Using the Willis technique, 25 per cent. of the East Coast natives and nearly 9 per cent. of the British South African natives were found to be infected. Samples of soil showed that all the mines examined were infected. Boots are not available for prophylaxis and practical steps should involve mass treatment of natives and prevention of soil pollution (which is difficult and costly). The former is considered to be the better method and all recruits should be treated with carbon tetrachloride at the recruiting depot. An effective latrine is described and its adoption and proper use recommended.

R. T. L.

Fischer (W. O.) & Orenstein (A. J.). **Hookworm Infection in the Gold Mines of the Witwatersrand.**—*Jl. Med. Assoc. S. Africa.* 1927. Apr. 9. Vol. 1. No. 7. pp. 158–163.

The investigation of the faeces of patients admitted to the City Deep Native Hospital showed a hookworm infection of 19 per cent. out of 638 examined. Marked anaemia was present in 9 cases and in only one did the general condition point definitely to a clinical diagnosis. The investigation of soil from four mines showed at least one sample infected with hookworm larvae.

R. T. L.

Le Gac. L'ankylostomiase au Ouadaï. [**Ankylostomiasis in Ouadaï (French Equatorial Africa)**].—*Ann. de Méd. et de Pharm. Colon.* 1927. Jan.–Feb.–Mar. Vol. 25. No. 1. pp. 123–126.

Of 900 persons examined 282, i.e., 31·3 per cent., were infested with hookworm. The species present was exclusively *Ancylostoma duodenale*. The author believes that *Necator americanus* does not occur in Ouadaï. Ankylostomiasis as a disease is seldom met with, those infected being simply carriers.

R. T. L.

Hill (Rolla B.). **The Amount and Distribution of Hookworm Infestation in Porto Rico.**—*Porto Rico Health Rev.* 1926. Sept. Vol. 2. No. 3. 8 pp. With 1 fig. [3 refs.]

In spite of the tremendous amount of work on hookworm control that has been carried out since 1899 in Porto Rico, little is known of

the relative intensity of infestation in different parts of the island. Egg counts were made in 9 districts and from these it appears that Utuado, Aguada, Camuy and Moca have light infections, Manatí, Barceloneta and Florida have heavier, while Adjuntas and Morovis have the heaviest of all. The last group is in the interior of the island and the conditions there are described as appalling, the average infestation totalling over 500 worms. The infection begins early in life and at 4 years of age the average number of worms is estimated at about 100. It is suggested that the relative freedom of the coastal regions is due to better sanitary conditions, absence of coffee plantations and somewhat lesser rainfall. The studies indicate that hookworm disease is taking a tremendous toll of life and health as it did when it was first discovered by Ashford in 1899.

R. T. L.

Ōi (T.). **Intestinal Parasites of Japanese Immigrants in Eastern Formosa, especially the Distribution of the Hookworm.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa.)* 1927. Feb. No. 263. English summary p. 4. [In Japanese.]

Oi found that immigrants in Formosa were infested with intestinal parasites, especially hookworm. He believes that the latter have some influence on outbreaks of blackwater fever. Children and women suffer more from a moderate infection with hookworms than do adult males.

T. W. M. C.

Ozoux (M.). L'ankylostomiase à la Réunion. [**Ankylostomiasis in Réunion.**]—*Rev. d' Hyg. et de Méd. Préventive.* 1927. May. Vol. 49. No. 5. pp. 362–365.

The author has found a case of hookworm in the Island of Réunion, but his stay there has been too short to obtain evidence as to the species.

R. T. L.

Oiso (T.) & Kawanishi (K.). **Experimental Supplement on Oral Infection with Ankylostoma, especially with the Young Larvae.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1927. July. No. 268. English summary pp. 1–2. [In Japanese.] [Govt. Med. Coll., Taihoku, Formosa.]

Following Asada's procedure the upper part of the small intestine was ligatured in 16 pups and below this point mature hookworm larvae and young larvae were introduced. A pup was also infected directly through the mouth. In another pup the upper part of the small intestine was disconnected, larvae were introduced into the lumen and the two ends then sutured together. The ends of the upper and lower intestine were sutured to restore the connexion. The authors observed the following results. The majority of hookworm larvae introduced directly into the intestine are found in that part, others are found in the mucous membrane. If mature *A. caninum* larvae are introduced directly into the intestinal canal of the proper host, i.e., dog, they develop further. When introduced through the mouth or directly by operation into the intestines very young larvae are almost all destroyed and discharged, but the larvae in the earlier encysted period may develop further in the intestine of the natural host without undergoing the migration deemed necessary by Asada.

R. T. L.

Shirai (Mitsuji). **Experimental Studies on the Oral Infection of Hookworm: with Special Reference to the Migration of Larvae in Body of Host.**—*Scientific Reports Govt. Inst. Infect. Dis.* Tokyo. 1926. Vol. 5. pp. 621–632. With 12 figs. on 2 plates. [8 refs.]

From experimental studies on dogs and rabbits it is shown that hookworm larvae are able to invade the mucosa of the oesophagus and intestine. They can also easily pass through the mucosa of the oral cavity and pharynx. The larvae can also pass through the wall of the alimentary canal and within 24 hours can be found in the abdominal cavity, liver, trachea and oesophagus.

R. T. L.

Manalang (C.). **Ancylostomiasis: Relation between Number of Ova per Gram of Formed Stool and Number of Female Worms harbored by the Host, I and II.**—*Philippine Jl. Sci.* 1927. May. Vol. 33. No. 1. pp. 35–45. [9 refs.]; 47–65.

Part I. Manalang has studied 18 hospital patients intensively and finds that the series taken as a whole showed perfect correlation between the number of ova per gram of stool "formed basis" of "random" specimens and the number of females expelled, viz., 44 ova per gram per female. But taken individually the cases show variance from 26 ova per female to 100 ova per female.

Part II. A series of observations were made also on 18 fresh cadavers for the purpose of determining some of the causes of the discrepances noted between the number of hookworm ova per gram of formed stool and the number of female worms discharged, in a series of patients treated with chenopodium and controlled by Stoll's egg counting method. The author concludes that variability in egg output in cases with a large number of females may be due to their distribution in a long stretch of the small intestine, the contents of which, carrying a variable number of ova, failed to mix in their course to the rectum. The variability may be due also to mechanical influence such as faecal fistula and intestinal obstruction, stasis in the caecum or elsewhere, good or poor egg-laying females and egg destruction. It appears likely that different races or strains of necator have different egg-laying capacities.

R. T. L.

Soper (Fred. L.). **The Relative Egg-Laying Function of *Necator americanus* and *Ancylostoma duodenale*.**—*Amer. Jl. Hyg.* 1927. Sept. Vol. 7. No. 5. pp. 542–560. With 6 text figs. [15 refs.] [Sch. of Hyg., Johns Hopkins Univ., Baltimore, Md.]

The average daily egg output of *Ancylostoma duodenale* is from 2–2½ times that of *Necator americanus* according to the method used by the author while investigating Paraguayan cases. The range of egg counts made on female worms is 0—1,120 for Necator, and 0—2,551 for Ancylostoma. Egg counts made on *A. caninum* secured at autopsy indicate that the variations found in counts are not due to medication or manipulation, but may reflect either irregularity in egg-laying or a cycle in egg production.

R. T. L.

Vidhikar (L. H.). **A Note on Charcoal Cultures for Hookworm Larvae.** *Jl. Parasit.* 1927. Mar. Vol. 13. No. 3. pp. 195–198. [4 refs.]

From the study of a series of carefully standardized cultures of hookworm larvae it was found that the best crops of larvae were secured from the nearly neutral human faeces alone. Blood charcoal proved superior to bone black (animal charcoal), while granular animal charcoal, willow wood charcoal and an acid-washed animal charcoal were distinctly inferior. Equal portions of stool and charcoal provided the optimum admixture.

R. T. L.

Svensson (Ruth M.). **Notes on Differences in Activity and Resistance between the Larvae of** *Ancylostoma duodenale* **and** *Necator americanus.*— *Jl. Parasit.* 1927. Mar. Vol. 13. No. 3. pp. 203–205. [5 refs.]

Preliminary experiments suggest that the larvae of *Necator americanus* are less resistant under different temperatures to drying than those of *Ancylostoma duodenale.* Necator larvae appear to have also a greater power of penetration through the skin.

R. T. L.

Heydon (G. M.). **The Differences between the Infective Larvae of the Hookworms of Man.**—*Med. Jl. Australia.* 1927. Apr. 9. 14th Year. Vol. 1. No. 15. pp. 531–538. With 2 text figs. [6 refs.]

The author describes in detail the differences between the infective larvae of *Necator americanus* and *Ancylostoma duodenale.* As a result of his investigations he recommends as a routine differential diagnosis Korke's measurement under a two-thirds of an inch objective of the distance from the oesophagus to the middle of the genital rudiments. This he states will separate the genera correctly in well over 95 per cent. of cases, provided the larvae have been suitably cultured and are well nourished. For absolute accuracy the buccal cavity should be examined.

R. T. L.

Lane (Clayton). **The Need for and Use of Controls in Hookworm Inquiries.**— *Jl. State Med.* 1927. Aug. Vol. 35. No. 8. pp. 458–473. [5 refs.]

Clayton Lane stresses the importance of controls applied separately to each separate factor in the study of ankylostome infections. The diagnostic techniques in use at present all adopt the floating principle, and those in general use are three in number, viz. Willis's direct gravity flotation technique, which mixes faeces with saturated salt solution, covers the vessel with a slide which after a time is removed for examination; Kofoid and Barber's indirect gravity flotation technique, which removes the top layer of a brine suspension by means of a loop of wire; and Lane's direct centrifugal flotation technique, which subjects the centrifugal precipitate of a watery suspension to centrifugal flotation, the mouth of the tube used being covered with a coverslip which is afterwards lifted off and examined for ova. The author summarizes the control count technique used by him to test the relative

merits of these methods and shows that direct centrifugal flotation technique is by far the most accurate means at our disposal for the detection of hookworm infection. He points out the use of this technique in bringing into prominence the relative inefficiency of those lines of treatment which are relatively or actually safe, and its value as an aid in the search for an anthelmintic drug which will in a single dose eliminate all hookworms without risk to the host.

R. T. L.

Fülleborn (F.). Zur "Hamburger Deckglasauszählung" für Hakenwurmeier. [**The Hamburg Coverglass Count for Hookworm Ova.**] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. May. Vol. 31. No. 5. pp. 232–236. With 3 text figs. [1 ref.]

Fülleborn, after much experiment with Hung's method [*ante*, p. 195] advises the use of one gram instead of two grams of faeces as Hung directs. The little boxes of copper plate can now be obtained with a depression in the base to hold one gram, and having a lid of tin plate which can also be used as a stand. These boxes are so cheap as to be suitable for mass diagnosis, and for this reason the lid is painted white, so that it may be written upon.

The calculation is made as in Hung's method, except that the different quantity of faeces used must be borne in mind. When the number of eggs per gram of faeces is over 20,000, Fülleborn uses a method similar to that of counting red blood cells. The three coverglasses are laid in turn on a slide divided into millimetre squares; the number of eggs in ten of these squares is counted, and the average of the thirty squares taken. If fewer eggs are present they are counted in two-millimetre squares. The whole surface of the coverslip need only be counted if the eggs are scanty, and here use of the squared slide dispenses with the mechanical stage.

The slide can be very cheaply prepared from gelatin foil. This is laid on millimetre graph paper, and the squares traced by means of scratching on the mat surface of the foil with a sharp knife. The foil is then cleared in cedarwood oil, mounted in canada balsam on a large slide, and covered with a large coverslip. Another method is to use a previously fixed photographic film. The squares are drawn on paper, photographed (with suitable reduction), and then copied on to the film, which can be mounted as before. This latter method produces less finely marked lines, but is preferable when many such slides are required.

R. T. L.

Caldwell (Fred C.) & Caldwell (Elfreda L.). **The Effect of Sea-Water on the Development of Hookworm Ova and Larvae** (*Necator americanus*).—*Jl. Parasit.* 1927. June. Vol. 13. No. 4. pp. 270–282. [18 refs.]

Sea-water retards the hatching of hookworm embryos and swiftly kills newly-hatched larvae although it does not prevent the development of the ova to the embryo stage. Under optimum cultural conditions the lethal action of sea-water was demonstrated by an average larval yield of 0·116 per cent. in contrast with 67·6 per cent. from cultures moistened with tap-water. The larval yield from faeces containing viable hookworm eggs submerged under sea-water for more

than one day and transferred thereafter to favourable conditions averaged only 0·75 per cent. These experimental results explain the findings in a field survey made in Panama, which showed that of the San Blas Indians who habitually defaecate directly into the sea below low tide, only 4·7 per cent. harbour hookworm in contrast with 82·3 per cent. among Indians in the interior and 89 per cent. in a non-Indian village where soil pollution is the rule.

R. T. L.

MANALANG (C.). **Effect of Carbon Tetrachloride, Chenopodium, and Thymol on the Ova of Expelled Hookworms.**—*Philippine Jl. Sci.* 1927. Apr. Vol. 32. No. 4. pp. 507–511.

The eggs recovered from female ancylostomes expelled with carbon tetrachloride failed to develop into active larvae, while those expelled by chenopodium and thymol showed active larval development. This ovicidal property of carbon tetrachloride strengthens its superiority as a treatment for ankylostomiasis. Tetrachlorethylene is similarly ovicidal. The author suggests the use of some inert porous powdered solid as a vehicle for anthelmintics. This would mechanically prevent fusion of solid drugs. Charcoal or chalk would probably serve.

R. T. L.

SCHAPIRO (Louis) & STOLL (Norman R.). **Preliminary Note on the Anthelmintic Value of Tetrachlorethylene based on Egg Counts before and after One Treatment.**—*Amer. Jl. Trop. Med.* 1927. May. Vol. 7. No. 3. pp. 193–198. [3 refs.]

Test treatment on 14 cases showed that tetrachlorethylene reduces the hookworm egg output by 93 per cent. when 3 cc. are administered and by 88 per cent. after 2 cc. The drug is more active in reducing whipworm egg counts than oil of chenopodium. The promising results merit further test with acid and neutral tetrachlorethylene.

R. T. L.

RICE (E. Milford). **Mass Treatment for Hookworm Infection on Tea Estates in Assam.**—*Indian Med. Gaz.* 1927. Mar. Vol. 62. No. 3. pp. 126–129.

Rice recommends that mass treatment of hookworms in Assam tea estates should be given in February and March, administering to adults 60 min. doses of carbon tetrachloride in one ounce of magnesium sulphate after the morning meal. New arrivals are generally infected and should be treated on arrival. This routine decreases the number of infected and makes heavy infestations harmless. He draws attention to the part played in the dissemination of human hookworm eggs and larvae by cattle, pigs and dogs feeding on human stools.

T. W. M. C.

STEKHOVEN, Jr. (J. H. Schuurmans). Het derde larvenstadium van *Anchylostoma duodenale* Dub. [**The Third Larval Stage of** *A. duodenale*.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 3. pp. 479–480. With 1 fig. [1 ref.]

The infective larva of *A. duodenale* shows more resemblance to *Necator americanus* than to *A. caninum*.

The head is provided with lips, the amphids are like those of *A. caninum*, the amphidial sac is large, the tube shaped part of the amphid is directed inward, so that the fore parts of the amphids form a right angle. The mouth is armed with sickle-shaped hooks, as in Necator, but the ends are not parallel to each other, the oesophageal glands more pronounced than in *A. caninum;* its bulbus has marked rings and lobular glands. Near the opening of the subventral glands the glandular tissue is more developed than in *A. caninum*. The contrast between the sphincter and the bulbus of the oesophagus is not marked. The intestinal sphincter and the excretory organs are as in Ancylostoma, the tail is like *A. caninum*, but the termination of the sheath as in the Necator larva.

W. J. Bais.

Stekhoven, Jr. (J. H. Schuurmans). **The Nemas Anchylostoma and Necator.** *Koninklijke Akademie van Wetenschappen te Amsterdam. Proceedings.* Vol. 30. No. 1. pp. 113–125. With 33 text figs. [10 refs.]

Differences between the 3rd stage larvae of *Ancylostoma caninum* and *Necator americanus* were found mainly in the structure of the head, in the covering on the apical end of the oesophagus, and the presence or absence of the anterior oesophageal bulb, in the structure of the posterior bulb, in the oesophageal glands, in the sphincter between oesophagus and intestine, in the shape and structure of the excretory apparatus, the shape of the tail and the distribution of the transverse striations on the skin. A series of clear high-power text figures illustrate the text.

R. T. L.

Stekhoven, Jr. (J. H. Schuurmans). Anchylostoma en Necator. [**Ancylostoma and Necator.**] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 2. pp. 223–225.

The author sets out in tabular form the microscopical characters by which the larvae of *Necator americanus* and *Ancylostoma caninum* can be differentiated.

R. T. L.

Tsunashima (Yoshito). [**On the Function of the Thyroid in Ancylostomiasis.**]—*Okayama Igakkwai Zasshi* (*Jl. Okayama Med. Soc.*). 1920. Dec. No. 443. [Summarized in *Japan Med. World.* 1927. June 15. Vol. 7. No. 6. p. 179.]

Kottmann's test is retarded in diseases with increased function of the thyroid. It is of interest to note that this occurs in cases of ankylostomiasis which did not show advanced anaemia, while in cases in which the anaemia was far advanced the action developed more rapidly than normal.

R. T. L.

Scriabine (C. J.), Podyapolskaya (V. P.) & Schoultz. L'autopsie helminthologique comme procédé précis pour l'étude de la faune helminthique chez l'homme.—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 5. French summary pp. 328–329. [In Russian pp. 270–283. 37 refs.]

TROPICAL OPHTHALMOLOGY: A REVIEW OF RECENT ARTICLES.—VIII*

CONJUNCTIVA.—*Spring Catarrh.* WOOD[1] considers that a calcium deficiency in the blood may be an important factor in spring catarrh and in malignant myopia. He suggests that spring catarrh might be defined as a reaction to climatic conditions, such as dryness, heat and dust, in young children subject to a deficient calcium content in the blood. He found that young patients suffering from the pericorneal type of the disease could be cured in three weeks by the use of calcium. Lid disease is more refractory; but there, too, calcium treatment is of service. Experience proved to him the value of small doses of parathyroid extract administered with the calcium salts. The association of conical cornea with spring catarrh suggests to him that the same aetiological factor may be present in both diseases. He found a calcium deficiency in every case of malignant myopia which was examined sufficiently early.

The connexion existing between chronic conjunctival inflammations and disorders of the skin or general constitution is easy to overlook and is perhaps sometimes neglected. COLE[2] relates his personal experience of an attack of conjunctivitis which lasted with slight remissions for about sixteen months. He tried various lines of treatment without success, but eventually came to the conclusion that he was a seborrhoeic subject and treated himself on these lines with immediate relief. He washed his scalp daily with sphagnol soap 15 per cent., and applied a lotion of salicylic acid grains 30, spirit of rosemary one drachm, castor oil two drachms and rectified spirit to one ounce every night to the eyelid.

Trachoma. TALBOT[3] states that trachoma is endemic in the northern and central parts of the Cameroons. Forest areas are completely free. But the distribution of the disease, though it apparently follows geographical lines, is unaffected by soil and climatic causes and is altogether due to racial factors. The Mohammedans and half-breeds suffer whilst the negroes escape. Nico DASCALOPOULOS[4], owing to his position as chief of the military ophthalmological department at Athens, has had an exceptional opportunity to study the distribution of the disease in Greece. He is of opinion that it occurs more or less all over the country and that its incidence has been influenced by the flow of immigrants from Egypt and Asia Minor. LUTRARIO[5] describes the world-wide distribution of trachoma and the mischief wrought by the disease. He recommends education of the public in hygiene and a popular recognition of the fact that any abnormal discharge from the

*For the seventh of this series see Vol. 24, pp. 472—482.

1 WOOD (D. J.). Calcium Deficiency in the Blood with Reference to Spring Catarrh and Malignant Myopia.—*Brit. Jl. Ophthalm.* 1927. May. Vol. 11. No. 5. pp. 224–230.

2 COLE (Arthur F.). Personal Experience of Chronic Diphtheroid Infection of Eyelid. [Correspondence.]—*Brit. Jl. Ophthalm.* 1927. Aug. Vol. 11. No. 8. pp. 413–415.

3 TALBOT. Trachome dans le Cameroun sous mandat français.—*Revue Internat. du Trachome.* 1927. Apr. Vol. 4. No. 2. pp. 51–54.

4 DASCALOPOULOS (Nico). Carte de la distribution géographique du trachome en Grèce.—*Revue Internat. du Trachome.* 1927. Apr. Vol. 4. No. 2. pp. 62–67. With 1 map in text.

5 LUTRARIO (Albert). Enquête sur le trachome.—*Bull. Office Internat. d'Hyg. Publique.* 1927. Mar. Vol. 19. No. 3. pp. 310–325. [1 ref.]

eyes requires immediate attention. Notification, though beneficial in some respects, is, perhaps, best restricted to schools and similar communities ; otherwise it tends to make sufferers conceal their ailment. Early cases should be afforded every facility for outpatient treatment in clinics, and special attention should be paid to the inspection of schools. The disease appears to be on the decrease in Uruguay. MEERHOFF[6] notes a decline during the past thirty years in the ratio of the general population affected from 1·83 to 0·60. From POSEY'S[7] observations amongst the Indians of Oklahoma compulsory education has not proved an unmixed blessing, since the boarding schools, into which the Indian youths who live remote from an educational centre are collected, serve as foci of trachoma infection. The incidence is said to be as high as 25 per cent. amongst the Navajo and Pueblo tribes, most of the cases being in the cicatricial stage. The adult Indians live under bad hygienic conditions which favour the spread of the disease. To raise the standard of living and education to that of the white population is the best method of controlling the plague. The deplorable condition of Russia as regards the prevalence of trachoma has already been noted by DEAR[8] (this *Bulletin*, Vol. 23, p. 922). TCHIRKVOSKI[9] furnishes additional evidence. In 1913, 83 per cent. of the families in the Chouvash Republic were infected ; and in 1923 the proportion had risen to 95 per cent. The spread of the disease is not due to any anatomical peculiarity in the eyes of the victims, but to the social conditions under which they live. Steps have been taken to deal with the plague by affording facilities to train oculists and by organizing travelling missions to treat and educate the population. Lack of resources and of trained doctors and the low cultural standard of the people hinder progress, but it is hoped that the constant efforts made may eventually prove successful in subduing the disease.

IBAÑEZ PUIGGARI[10], FUCHS (Ernesto) FERRO & CRAMER[11] have written on conditions in Buenos Aires district of South America. Trachoma appears to be widespread in the industrial centres, and in those areas where insanitary conditions prevail. The fact that about 40 per cent. of the cases were in the cicatricial stage shows that the danger is a real one. CALAMATTA[12] regards the disease as a veritable scourge in the Tucuman Province, and appeals to the authorities to deal with it in earnest by establishing trachoma dispensaries and by building suitable

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6 MEERHOFF (W.). [Trachoma in Uruguay 1894–1925.]—*An Facul. de Med.* Montevideo. 1926. Aug. Vol. 11. p. 521. [Summarized in *Jl. Amer. Med. Assoc.* 1927. Apr. 23. Vol. 88. No. 17. p. 1359]

7 POSEY (William Campbell). Trachoma among the Indians of the Southwest.—*Jl. Amer. Med. Assoc.* 1927. May 21. Vol. 88. No. 21. pp.1618–1619.

8 DEAR (W. R.). Trachoma in Russia.—*Milit. Surgeon.* 1926. June. Vol. 58. No. 6. pp. 611–619. With 3 figs.

9 TCHIRKOVSKI. Court aperçu de la propagation du trachome dans la région moyenne du Volga de l'U.R.S.S. et des mesures prises pour le combattre. —*Revue Internat. du Trachome.* 1927. Jan. Vol. 4. No. 1. pp. 8–18.

10 IBAÑEZ PUIGGARI (Miguel). El tracoma en el interior de la Republica. Informe al Sr. Presidente del Departamento Nacional de Higiene, Dr. Gregorio Aráoz Alfaro.—*Semana Méd.* 1927. June 23. Vol. 34. No. 25 (1745). pp. 1531–1534.

11 FUCHS (Ernesto), FERRO, PUIGGARI (Ibañez) & CRAMER (Bernasconi). El problema del tracoma en el pais. Informe elevado a la presidencia del Departamento.—*Semana Méd.* 1927. Aug. 11. Vol. 34. No. 32 (1752). pp. 386–387. [National Dept. of Hyg. Buenos Aires.]

12 CALAMATTA (Domingo). Plan de lucha antitracomosa en la Provincia de Tucumán.—*Semana Méd.* 1927. Aug. 4. Vol. 34. No. 31 (1751). pp. 295–298.

annexes to the existing hospitals. Malaria, tuberculosis, poverty and alcoholism are associated evils in the province.

Noguchi[13] reports that he has succeeded in isolating a micro-organism from five cases of trachoma occurring in pupils of the Albuquerque Indian school, New Mexico. The micro-organism induced in Macacus rhesus monkeys and in the chimpanzee a chronic granular conjunctivitis resembling that observed in the patients from whom the culture was obtained. It is a minute, Gram-negative, apparently non-motile, pleomorphic bacilliform organism which grows on a semi-solid medium containing fresh animal serum and haemoglobin, but fails to do so on any of the ordinary culture media, and only occasionally grows on blood-agar. Of twelve monkeys inoculated, eight, in from two to four weeks, developed a slowly progressive chronic granular conjunctivitis which resembled trachoma in the character of the lesions and in their localization. Scar formation occurred in one monkey seven months after inoculation. Four out of a second batch of nine monkeys inoculated from those first infected developed similar changes.

An account of trachoma in relation to other conjunctival diseases seen during the years 1924 and 1925 at the Jassy hospital in Roumania is given by Elena Puscariu[14]. 760 cases of conjunctival disease, representing 20·6 per cent. of the total, were seen during the period. Trachoma accounted for 72 per cent.; diplo-bacillary conjunctivitis for 17 per cent.; Koch-Weeks for 1·0 per cent.; and follicular for 0·5 per cent. Phlyctenular kerato-conjunctivitis is said to have been the most common secondary condition. Follicular conjunctivitis appears to be remarkably rare and only four cases of it seem to have been encountered during the two years. Twelve patients were treated for entropion during the period.

Nicolle and Lumbroso[15] have caused in man a granular form of conjunctival inflammation by the inoculation of material obtained from rabbits suffering from the "natural" variety of the disease. The attack followed exactly the same course as it does in the case of the Algerian baboon. After a long incubation period of about two months the inflammation appeared in the conjunctiva of the lower lid and after some delay extended to that of the upper lid. It was found possible to produce the disease with a filtered virus. Nicolle[16] has given some further particulars about this disease. It occurs in rabbits soon after birth and first shows itself by the appearance of scattered granulations. These subside later but plaques of follicular tissue persist at the outer and inner angles. The lower lid is principally affected, but a general dissemination can always be reproduced by a simple scarification of the conjunctiva. Nicolle attributes the disease to an infection from the soil and states that it is quite distinct from true trachoma.

13 Noguchi (Hideyo). Experimental Studies of Trachoma. [Abstract.]—*Bull. New York Acad. Med.* 1927. June. Vol. 3. No. 6. pp. 395–399.

14 Puscariu (Elena) & Lazaresco (Eugénie). Le trachome pendant les années 1924 et 1925 à la clinique des maladies des yeux de la faculté de médecine de Jassy (Roumanie).—*Revue Internat. du Trachome.* 1927. Jan. Vol. 4. No. 1. pp. 29–39. With 3 text figs.

15 Nicolle (Charles) & Lumbroso (U.). Nouvelle contribution à la connaissance de la conjonctivite granuleuse naturelle du lapin.—*C. R. Acad. Sci.* 1927. May 2. Vol. 184. No. 18. pp. 1031–1032.

16 Nicolle (Charles). La conjonctivite granuleuse du lapin et l'origine du trachome.—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. .2 No. 14, 15 & 16. pp. 243–245.

T. A. Lea[17] reports that he has found acetic acid useful in the treatment of trachoma. After washing out the eye with boracic acid and instilling cocaine, he pricks each granulation with a tattooing needle previously dipped in acetic acid which has been diluted by the addition of an equal part of water. The conjunctiva is then washed again and cold compresses are applied to the lids. The treatment is repeated two or three times a week. Hypertrophied papillae are touched with sulphate of copper or with a 2 per cent. solution of silver nitrate. Abadie[18] highly praises the efficacy of Blaizot's anti-gonococcal serum in the treatment of gonorrhoeal ophthalmia and blenorrhoea neonatorum, and thinks its use should be extended in countries where these diseases are rife. He suggests, too, that the remedy should be given a trial in obstinate cases of trachoma. He makes a useful protest against the common practice of directing all treatment in trachoma towards the destruction of the "granulations." These merely signify the presence of an unknown infective agent. He relates particulars of a case of pannus crassus in which he induced an attack of gonorrhoeal ophthalmia and secured a remarkable cure in consequence.

An historical account of this form of treatment is furnished by L. Berthelot[19] who records that Joeger of Vienna was the first to use it in the year 1812. This may be correct, but one must remember that for ages past urine has in many countries been favourably regarded as an eye lotion by the itinerant quack. Possibly it owes its reputation to an occasional cure of pannus by an attack of gonorrhoeal ophthalmia. The reviewer has often seen various diseases of the eye complicated by a gonorrhoeal ophthalmia which had followed the application of virgin's urine as a collyrium. Evidently a mistake had been made in dispensing the prescription! Chaulmoogra oil as a remedy for the disease has been tried by Morax[20], by Lussich-Matkovich[21] and by Gabrielidès[22]. The reports show that the remedy, though not a specific, is a useful one, especially where pannus is present. It has no injurious action on the corneal epithelium, and causes very little pain. Grattage is required in order to secure its penetration. It is best used in combination with the more established methods of treatment. Collin[23] recommends the use of an ethyl chloride spray instead of carbon dioxide snow when the latter cannot be easily procured. The cornea is well protected by a spatula wrapped in gauze, and a fine spray played on to the surface of that part of the

17 Lea (J. A.). Treatment of Trachoma by Acetic Acid.—*Brit. Jl. Ophthalm.* 1927. Apr. Vol. 11. No. 4. pp. 150–152.

18 Abadie. Considérations sur le traitement du trachome.—*Revue Internat. du Trachome.* 1927. Apr. Vol. 4. No. 2. pp. 43–47.

19 Berthelot (Louis). [Résumé of Thesis.] Bibliothèque de la Faculté de Médecine de Paris, 1800, no. 31, volume 3. Du traitement du pannus par l'inoculation blennorraggique envisagée particulièrement en France.—*Revue Internat. du Trachome.* 1927. Apr. Vol. 4. No. 2. pp. 47–51.

20 Morax (V.). Trachome unilatéral de l'adulte. Traitement par l'huile de chaulmoogra.—*Revue Internat. du Trachome.* 1927. July. Vol. 4. No. 3. pp. 74–79.

21 Lussich-Matkovich (V.). Discussion of Morax.—*Revue Internat. du Trachome.* 1927. July. Vol. 4. No. 3. p. 79.

22 Gabrielidès (C.). Traitement du trachome par l'huile de chaulmoogra.—*Revue Internat. du Trachome.* 1927. July. Vol. 4. No. 3. pp. 80–85. [1 ref.]

23 Collin (Léon). L'action du froid dans le trachome.—*Ann. de Méd. et de Pharm. Colon.* 1927. Jan.–Feb.–Mar. Vol. 25. No. 1. pp. 131–134.

conjunctiva which it is desired to treat. Two or three treatments may be given at a sitting if an interval of some minutes is left between each.

The case recorded by Jean SEDAN[24] suggests that trachoma may on rare occasions prove a blessing in disguise. A man, suffering from trachoma with pannus, when working in a soap factory, was splashed over his face and eyes with a quantity of strong caustic soda solution. Much injury resulted, but the sight of the eye more affected by pannus was saved owing to the vascularity of the cornea.

UVEA.—*Cyclitis Artefacta.* LESTAGE & SOULOUMIAC[25] investigating a mysterious epidemic of conjunctival inflammation and cyclitis, which occurred amongst sailors on some French cruisers, found that a solution of " grains de Val " was capable of producing similar symptoms to those of the sufferers if instilled into the conjunctival sac. " Grains de Val " are composed of aloes 10 parts, podophyllin 1 part, and extract cascara sagrada 10 parts. An acute inflammation with circumcorneal injection, tenderness and lowered ocular tension occurs about 36 hours after an instillation of the drug. Recovery takes place in about four or five days. As in most of such cases the lower part of the cornea and the conjunctiva lining the lower lid were chiefly affected.

LENS.—KIRBY[26] has successfully cultivated lens epithelium *in vitro*. He employed the method and technique of CARREL in his experiments. The eyes of chick embryos, incubated for five days at 37·5° C., were found the most suitable ; before and after this age it is almost impossible to remove the lens quite free from contamination by adherent cells of other tissues. After removal from the embryonic eye the lens is incubated for twenty-four hours at 37·5° C. It is then removed from the medium and incised anteriorly. The lens epithelium is stripped off as far as the equatorial region, and, on the point of a needle, is implanted into the embryonic juice plasma clot medium. Proliferation and migration occur from twelve to twenty-four hours later. Explants of lens cortex, however, fail to grow under these conditions. One strain of lens epithelium was cultivated *in vitro* through seventeen generations during a period of six weeks.

Cataract. CRUICKSHANK[27] has had an opportunity of examining the progress of cases operated on during 1923–4–5 at HOLLAND'S clinic at Shikarpur and has analysed the results in an interesting paper. 90·3 per cent. of the operations were by Smith's method, 5·3 per cent. by Barraquer's, and in 4·3 per cent. the capsulotomy operation was performed. Vitreous escape occurred in 10 per cent. of the cases and iris prolapse, including iris incarceration, in 1·1 per cent. The percentage of sepsis was 1·5. The figures suggest that vitreous escape occurred more frequently in cases subjected to a complete iridectomy ; none took place in 144 patients on whom a marginal iridectomy was performed. 650 cases with complete iridectomy show 13 per cent. of vitreous

24 SÉDAN (Jean). Pannus trachomateux ayant protégé la cornée dans un cas de brulure par soude caustique (accident de savonnerie).—*Revue Internat. du Trachome.* 1927. Jan. Vol. 4. No. 1. pp. 39–41.

25 LESTAGE & SOULOUMIAC. Syndrome oculaire à forme de cyclite déterminé par l'instillation de la solution obtenue au moyen de grains de Vals. —*Arch Méd. et Pharm. Nav.* 1927. Jan.–Feb.–Mar. Vol. 117. No. 1. pp. 64–68.

26 KIRBY (D. B.). A Study of the Nutrition of the Crystalline Lens.—*Trans. Amer. Acad. Ophthalm. & Oto-Laryn.* 1926. pp. 137–154.

27 CRUICKSHANK (M. M.). Observations on the Complications following 4,000 Cases of Cataract Extraction.—*Brit. Jl. Ophthalm.* 1927. June. Vol. 11. No. 6. pp. 275–284. [12 refs.]

loss, whilst 600 cases with marginal, peripheral, or no iridectomy show 6 per cent. An analysis of 1,294 operations shows a considerably higher rate of iris prolapse amongst 650 patients on whom a complete iridectomy was performed than among those on whom the iridectomy was partial or omitted. CRUICKSHANK says that "if Barraquer's technique is followed, the eye being well under the influence of atropine, and the lens tumbled," an iridectomy is not essential. The complication of choroidal haemorrhage was encountered very frequently—in 1·3 per cent. A high incidence of glaucoma in the district is blamed for this; and the routine use of the tonometer has led to a decrease in the number of expulsive haemorrhages. The author does not, however, discuss the possible influence of the intracapsular operation upon the complication.

The patient who violently squeezes his eye whilst being operated upon for cataract is a danger to himself and a cause of grave anxiety to the surgeon. Paresis of the orbicularis by injections of novocaine and adrenalin solution is now largely employed as a means of meeting this contingency. R. E. WRIGHT[28] recommends that paresis of the whole facial nerve should be induced by an injection at the stylo-mastoid foramen. An assistant pulls the lobe of the ear upwards and forwards. The surgeon locates the tip of the mastoid process by a finger of his left hand and enters the needle at this level behind the fold of skin made by the drawn up lobe. The needle, which at first lies horizontally, is pushed upwards, inwards and backwards towards the anterior face of the process. On touching the bone it is slightly withdrawn and is worked round until it is just deep to the inner aspect of the anterior border of the process. A series of advances and withdrawals is made until the syringe lies in an almost vertical position. The point of the needle traverses the digastric fossa during the manoeuvre and comes to lie in the neighbourhood of the stylo-mastoid foramen. Some twitching of the facial muscles may occur at this stage. 1 to 2 cc. of the novocaine mixture is injected. Facial paralysis should come on in from five to fifteen minutes. WRIGHT uses 4 per cent. novocaine, 2 parts, and 1-1000 adrenalin 1 part. The solution should be freshly prepared. He recommends an "Alston Washerless" dental syringe of 60 minim capacity and a needle 5 cm. long.

It may sometimes prove difficult to control fully the eyeball of a patient under operation—especially when making the section during a cataract extraction. This may be due to an exceptionally delicate conjunctiva, or, more often, to a faulty application of the fixation forceps. This should be applied at right angles to the globe near the limbus; if it is placed obliquely, at an acute angle, the teeth of the instrument are likely to tear through the membrane. DANTRELLE[29] recommends the use of a temporary suture passed through the cornea near the limbus as a means of affording complete control of the globe. A Kalt's needle is threaded with white silk. The silk is fixed by passing the needle back through the strands close to the free end; the inconvenience of a knot is thus avoided. A small bite of corneal tissue, 3 mm.

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28 WRIGHT (R. E.). Blocking of the Main Trunk of the Facial Nerve in Cataract Operations based on Experience of over 150 Cases.—*Arch. of Ophthalm.* 1926. Vol. 55. No. 6. pp. 555–559.

29 DANTRELLE. De la contention du globe nouveau procédé de fixation.—*Ann. d'Oculistique.* 1927. Mar. Vol. 164. No. 3. pp. 201–209. With 6 text figs.

long and parallel to the limbus, is taken by the needle and the suture is passed. Care is exercised not to enter the anterior chamber. Perfect control of the eyeball can be maintained by gripping the thread with a forceps close to the points of entry and exit. DANTRELLE states that he has never experienced any bad result from this procedure, and that the corneal wound heals without leaving any trace.

Henry SMITH[30], discussing the question of extraction of the lens in its capsule, defends the principle of delivery by pressure applied on the surface of the eye against delivery by traction applied within the eye. He gives due credit to MACNAMARA and MULRONEY for their share in developing the operation of expression in the capsule. Those who attempt BARRAQUER'S phakoerisis operation are advised to make the incision larger than that laid down by Barraquer—a full 190° instead of 144°. Smith suggests that Barraquer's successful results are probably due to his having first dislocated the lens by pushing it straight backwards. After dislocation the lens is rolled over and is pushed forwards through the pupil by the instrument which now lies behind it. It is claimed that the great increase during the past thirty years in the number of cataract operations performed in the Punjab, where expression in the capsule holds the field, is evidence that the operation is superior to capsulotomy, since a corresponding increase has not occurred in some other Provinces where capsule laceration is ordinarily done. It may be noted, however, that the statistics quoted for Madras during the same period show an increase in the number of operations almost equal in proportion to that of the Punjab.

J. Russell SMITH[31], dealing with the subject of Barraquer's operation of phakoerisis says, that he has had the opportunity of observing the operation performed in many Indian clinics. He was puzzled by the fact that, whilst BARRAQUER himself is undoubtedly able to perform the operation with perfect success, yet other highly skilled surgeons failed badly, although they followed the recognized technique. He questons the statement that in phakoerisis the zonular fibres of the ligament are ruptured close to the periphery of the lens owing to " vibrations " in the vacuum, whereas in other methods of intracapsular extraction they are dragged out by the roots from the ciliary body ; and he states " he has yet to meet anyone who can demonstrate any difference, in the matter of the presence of tags of zonule, between senile cataractous lenses, extracted from the human eye, which is in any way dependent on the method by which they were extracted." He suggests that success in Barraquer's operation is achieved by pushing the lens with the erisophake and not by pulling. The lens is pushed by the instrument slightly backwards into the vitreous, and the zonular fibres are ruptured by its displacement. Care should be taken to dislocate the lower portion of the lens first, pressing it backwards by supinating the forearm ; the upper portion is then displaced by a movement of pronation. Once the lens has been completely dislocated version is performed. The lens can then be delivered as a " tumbler." It is implied that the lens is delivered rather by pressure applied from behind than by traction. It is necessary to make a sufficiently large section.

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30 SMITH (Henry). Intracapsular Extraction of Cataract, including the Most Recent Advances.—*Indian Med. Gaz.* 1927. Mar. Vol. 62. No. 3. pp. 121–126. With 4 text figs.

31 SMITH (J. Russell). Barraquer's Operation.—*Brit. Jl. Ophthalm.* 1927. Apr. Vol. 11. No. 4. pp. 152–180. With 21 text figs.

General Diseases.—

Kala azar. Bhaduri[32] found non-progressive, radial streaks of *opacity in the lens* of a patient, aged 22, who had suffered from kala azar and had been treated by injections of soamin and sodium ammonium tartrate. A low degree of myopic astigmatism was present. Previous to his illness his vision had been tested by the Ambulance Corps and had been found to be normal. The patient was under Bhaduri's observation for one-and-a-half years and the opacities remained unaltered during the period. The same observer[33] met with a case of *amblyopia following injections of urea stibamine for kala azar.* The patient was a Hindu woman aged 22. Some dimness of vision was noticed after nine injections of the drug. After an interval two further injections were given and the sight then deteriorated to 6-60, but a fortnight later improved to 6-9. Temporal pallor of the optic disc, green blindness, and a slight concentric contraction of the visual field were observed. Bhaduri suggests that the renal excretion of the drug may be lowered in such a case ; it would therefore be advisable to lengthen the interval between the injections should this be suspected at any time. Syphilis, too, may be a factor, as the disease may render the optic nerve more sensitive to the poisons contained in the aromatic organic preparations of antimony or arsenic.

Trypanosomiasis. Neame[34] has described in detail the histological findings in the eye of a dog which developed parenchymatous keratitis after an infection with trypanosomiasis. He concludes that a parenchymatous keratitis is often associated with trypanosomiasis in animals of various species, and perhaps also in man, and that in some cases it is accompanied by iritis and cyclitis. The disease seems to bear the closest resemblance clinically and pathologically to distemper keratitis in dogs and to syphilitic keratitis in man. In the specimen examined the corneal epithelium was intact and an infiltration of the substantia propria was present, most marked in the deeper layers at the periphery. Trypanosomes, appearing considerably smaller than when seen in smear preparations, were found in various parts of the substantia propria, being particularly numerous in the neighbourhood of the capillaries. They were also observed in the anterior chamber, in the spaces of the pectinate ligament, and in the vitreous near the ora serrata.

Myiasis. Wright[35] has described a case of myiasis of the cornea in a patient suffering from corneal degenerative changes. Maggots developed in blood smeared agar and in glycerine agar tubes on which crusts from the cornea had been implanted. The maggots were hatched out by Wright and the flies were identified by Sitarama Iyer and by W. S. Patton as *Apiochaeta scalaris* (*ferruginea*), belonging to the family of Phorinae.

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32 Bhaduri (B. N.). A Case of Opacities of the Lens occurring as a Sequel to an Attack of Kala-Azar.—*Indian Med. Gaz.* 1927. Mar. Vol. 62. No. 3. p. 144. With 1 diagram in text.

33 Bhaduri (B. N.). Urea Stibamine Amblyopia.—*Calcutta Med. Jl.* 1927. Jan. Vol. 21. No. 7. pp. 327–341. With 1 chart.

34 Neame (Humphrey). Parenchymatous Keratitis in Trypanosomiasis in Cattle and in Dogs, and in Man.—*Brit. Jl. Ophthalm.* 1927. May. Vol. 11. No. 5. pp. 209–216. With 5 text figs. [15 refs.]

35 Wright (Robert E.). Myiasis with Chronic Degeneration of Cornea.—*Amer. Jl. Ophthalm.* 1927. June. Vol. 10. No. 6. pp. 411–412. [1 ref.]

Miscellaneous.—Delord & Villard[36] have recorded the case of an unfortunate doctor who, whilst performing vaccination, was struck in the eye by a tiny drop of *vaccine*. The conjunctival sac was immediately washed out, but the conjunctiva became inflamed that evening. Three days later the cornea was ulcerated and the iris intensely inflamed. A severe iridocyclitis occurred in eight days. Secondary glaucoma supervened and the eye was enucleated two months after the accident. Noteworthy features are: (1) the rapidity with which the inflammation developed and extended to the deeper structures; and (2) the intractable character of the inflammation. The authors comment upon the rarity of the condition; but, as Ml. Camus[37] remarked, vaccinia of the lids is not so very uncommon. The reviewer remembers two cases, one being that of a girl suffering from hysterical amblyopia who deliberately inoculated her lids from the arm of a vaccinated baby in the same ward.

Effect of Glare. Rippon[38] has found that pilots of the R.A.F. serving in India are liable to be affected injuriously by the glare. This was shown: (1) by ocular irritation; (2) by symptoms of asthenopia; (3) by a diminished power of convergence, and (4) in a few cases by the development of night blindness. Bad landings are a natural consequence. Responsibility rests on the Medical Officer to encourage pilots to keep themselves physically fit. He should be watchful for early signs of ocular fatigue, and should promote the general use of glare protectors.

Causes of Blindness in Atchin. Tijssen[39] found that corneal leukomata, often due to smallpox or to trauma, were a common cause of blindness in Atchin. Trachoma, blenorrhoea, and other varieties of infectious conjunctival inflammation appear to be relatively rare amongst the village population. He suggests that a deficiency of vitamin-A may have some part in causing the diseases which produce blindness.

Reports.—The Report of the Madras Government Ophthalmic Hospital for the year 1926[40] demonstrates the progressive character of the institution and the vast amount of careful work performed by Lt.-Colonel Wright and his staff. 3,898 in-patients and 23,412 out-patients were admitted, and 5,266 operations (1,601 being for senile cataract) were performed during the year. The statistics relating to the diseases treated are always most interesting. Koch-Weeks conjunctivitis accounted for 1,690 admissions, trachoma for 843, and phlyctenular for 712. 127 cases of keratomalacia were admitted. With regard to cataract, 24 patients suffered from the juvenile form and 2,189 from the senile, whilst only two had lamellar cataract. The comparative rarity of lamellar cataract in South India is notable, and it would be interesting to learn whether this rarity is peculiar or whether

36 Delord & Villard. Accident oculaire grave par projection de vaccin jennerien.—*Bull. Acad. Méd.* 1927. May 17. Year 91. 3rd Ser. Vol. 97. No. 20. pp. 607–609.

37 Camus (L.). Discussion of Delord & Villard.—*Bull. Acad. Méd.* 1927. May 17. Year 91. 3rd Ser. Vol. 97. No. 20. pp. 610–611. [1 ref.]

38 Rippon (T. S.). Flying in Tropical Climates, with Particular Reference to Sun Glare.—*Jl. State Med.* 1927. June. Vol. 35. No. 6. pp. 355–359.

39 Tijssen (J.). Oorzaken van blindheid in Atjeh.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 1. pp. 99–101.

40 Madras. Administration Report, Statistics and Professional Rep. of the Govt. Ophthalmic Hospital, Madras, for 1926. [Wright (R. E.).]—33 pp. With 15 figs. on 6 plates. 1927. Madras. Govt. Press.

it is found in other tropical countries which are subject to climatic conditions similar to Madras. Rickets, too, is seldom seen amongst the lower classes in Southern India ; and there is, of course, a well recognized link between the two diseases. Vitreous loss during cararact extraction has been reduced to a low figure—1·46 per cent. Eight per cent. of iris prolapse after operation is, however, a high rate ; the statement that a peripheral iridectomy was more frequently employed than in the previous year may have some bearing on the matter. Bacteriological examinations of conjunctival scrapings were made on a series of 205 patients who had undergone a most careful disinfection as a preliminary to cataract extraction. No fewer than 45 per cent. were found to harbour organisms, the majority being staphylococci (found in 35 per cent. of the examinations). These figures are impressive and increase one's respect for the natural defences of the ocular tissues against bacterial invasion. Only 96 cases were subjected to sclero-corneal trephining. This diminution is due to the trial of other operative measures ; but it is stated that " as the result of the year's experience the number of trephinings next year will be as high as formerly, because, even in advanced and doubtful cases, trephining seems to be the best way of keeping the tension down." The refraction work of the Hospital is quite considerable, 2,316 patients having been treated for refraction errors during the year. Particulars of many interesting cases are recorded, some with illustrations. A trial was made of X-ray exposures in the treatment of rhinosporidial polypus of the conjunctiva, but it was unsuccessful. Local applications of solutions of quinine sulphate, of antimony tartrate, and of picric acid have all proved failures in this disease. A warning is given against a rather common tendency to diagnose trachoma too readily and in consequence to institute a prolonged and vigorous treatment with silver salts.

The Annual Report of the Ophthalmic Section of the Egyptian Government for the year 1923[41] records a steady progress. 156,837 new patients were seen and 82,466 operations were performed during the year. This represents an increase of 17 per cent. and 8 per cent. respectively over the previous year. The figures in connexion with conjunctival diseases are of course most interesting. Trachoma accounted for 135,328 admissions, gonorrhoeal ophthalmia for 9,331, and Koch-Weeks ophthalmia for 4,700. Only one case of ophthalmia neonatorum is shown. Snellen's operation for trichiasis and entropion was performed on 27,498 eyes and mucous membrane grafting on 5,069. School inspection was carried out in sixteen schools. Of 7,551 school-children treated, only 87·3 per cent. had both corneae free from opacity. Primary glaucoma in its various forms led to 3,016 admissions (1·73 per cent. of the total), and senile cataract to 3,013 ; so that the incidence of the two diseases in Egypt is remarkably similar. Trephining for glaucoma and extraction with iridectomy for cataract were the favoured operations for these conditions. A total of twenty-three hospitals were working at the end of the year.

The first general report of the Memorial Ophthalmic Laboratory at Giza[42] marks an important advance in the attack against tropical and

41 Egypt. Ministry of the Interior. Dept. of Public Health. Eleventh Ann. Rep. of the Ophthalmic Section, 1923.—29 pp. With 1 chart. 1927. Cairo : Govt. Press.

42 Egypt. Ministry of the Interior. Dept. of Public Health. First General Report of the Memorial Ophthalmic Laboratory, Giza. 1926. [Wilson (Rowland P.)]—9 pp.

subtropical diseases of the eye. The money for the construction of the laboratory was provided by the Imperial War Graves Commission as a Memorial to the men of the Egyptian Labour and Camel Transport Corps who fell in the Great War. Work was started in September, 1925, under Dr. Sobhy Bey and was carried on by him until the arrival of H. A. Haig and R. P. Wilson who were appointed Pathologist and Director respectively. Reports are furnished gratis on specimens received from public and private clinics throughout Egypt; and research work on trachoma, gonorrhoeal ophthalmia and glaucoma is being carried out. Post-graduate classes are also held. The laboratory is well placed to secure that co-operation between pathologist and physician which is so essential to success, and it is likely to realize the hopes of MacCallan and others responsible for its inception.

H. Kirkpatrick.

REVIEWS AND NOTICES.

Koumans (Alfred Karel Jan.) Over lymfocytenwaarden en lymfocytaire functies naar aanleiding der tropenlymfocytose. [**Values and Functions of Lymphocytes in Respect of Tropical Lymphocytosis.**] [Thesis.]—223 pp. With 7 figs. 1926. Maassluis.—J. Van der Endt & Zoon.

The author makes a critical research into the different fundamental methods of making blood smears and recommends the method of smearing the blood drop with a flexible (celluloid) spreader one mm. in thickness in narrow films (six mm. = ¼ inch) on object glasses. For various reasons he prefers Roger's method of counting to that of Schilling. The blood was always taken in the morning before breakfast, and from the finger tip. The staining method was that of Kiewit de Jonge.

The figures published by Schilling of the proportions of the different blood-cells were found not to be exact. In our latitude the lymphocyte-proportion should be fixed at 30–35 per cent. The significance of the much discussed war-lymphocytosis therefore becomes questionable.

Tropical lymphocytosis begins after a stay of about 18 months and vanishes again in Europe (as is the case also in natives). Lymphocytosis is acquired also by a stay in the arctic regions, in the high mountains and near the sea-shore; the author presumes that these lymphocytoses are caused by the more intensive destruction of the body cells, the result of the more intensive ultra-violet irradiation in the polar regions during the midnight sun period, in the high mountains and near the sea-shore. In the tropics on the contrary the caloric-radiation would cause this phenomenon. These *light*-lymphocytoses are distinguished from the *caloric* lymphocytosis by an accompanying monocytosis, a quicker development, a shorter existence and a reaction of the skin (sun-burn). Together with the change in the lymphocyte count produced by digestion the author regards the above-mentioned forms as physiological lymphocytoses.

Regarding the lymphocytic functions the author states that the lymphocytes take part in digestion of fats and carbohydrates in the intestinal canal, where they activate the pancreatic fluid by producing peptone. In the tissues they provide for the cellular assimilation of the same materials. In connexion with the various methods of causing artificial lymphocytosis, the part that the lymphocytes take in immunization against cancer and tuberculosis is discussed. The author considers the action of Röntgen radiation therefore rather as indirect by production of artificial lymphocytosis than as direct by destruction of tumour cells.

The author has taken much trouble in the preparation of this thesis and even made a voyage to Spitzbergen. The conclusions he arrives at, however, may be open to some criticism. Thus the figures regarding the arctic midnight sun lymphocytosis are rather small and not very conclusive.

A few inaccuracies excepted (on page 24 the Dutch for "physical" is used where "psychical" is meant, and on page 205 "provided" is used for "unless") the contents have been carefully worked out and may be considered as an interesting contribution to the knowledge of lymphocytes.

J. E. Dinger.

Schlossberger (Hans). Chemotherapie der Infektionskrankheiten. [**Chemotherapy of Infectious Diseases.**]—*Spezielle Pathologie u. Therapie innerer Krankheiten.* pp. 743–866. With 12 text figs. [n.d.]

The aim of chemotherapy as defined by the author is the sterilization of the infected body by means of substances of defined chemical constitution—in contrast to that effected by chemically undefined serum antibodies. In

the first part of the work the development of chemotherapy is traced from the point of view of relationships between chemical constitution and therapeutic action; the important influence of physical characters is also discussed. In the second or special section, each group of chemical substances, e.g., arsenicals, gold compounds, quinine alkaloids, etc., is considered in relation to the particular infections in which the respective substances produce chemotherapeutic effects. A full account is given of the results obtained both in experimental and in naturally acquired infections. Those interested in the historical aspect will find also that the uses of the various drugs in antiquity are dealt with in considerable detail. In the absence of clear proof as to the mode of action of chemotherapeutic agents in many cases, it is pointed out that two possibilities must be borne in mind, viz., that the drug may act either directly upon the parasites or indirectly by stimulating the protective mechanisms of the host. The presentation of the subject is throughout scientific in its form, and the freedom from excess of practical details should enable readers to obtain a good perspective of what is already a large subject. There are few omissions, although mention is not made of the antiseptic properties of mercurochrome, the phenomenon of chemotherapeutic interference in trypanosome infections, or the trypanocidal properties of aminostyrylquinoline compounds. The attention which is paid to the contributions of workers in various countries is a welcome feature. A bibliography of about six hundred references completes this valuable survey.

C. H. Browning.

Rockefeller Foundation. **International Health Board. Thirteenth Annual Report January 1, 1926–December 31, 1926.** [Russell (F. F.)] pp. xiv+219. With 50 figs. (10 maps). 1927. New York: 61 Broadway.

During the year 1926 the International Health Board of the Rockefeller Foundation disbursed (at an administrative cost of about 7 per cent.) more than 3¼ million dollars under the following heads: relief and control of hookworm, 346,735 dollars; county [rural] health work, 241,933; malaria control, 235,502; yellow fever control, 589,254; public health education, 1,292,749; public health nursing, 51,221; public health administration, 49,200; public health laboratories, 39,160; field expenses not specifically allotted, 183,319; miscellaneous charges, 10,319.

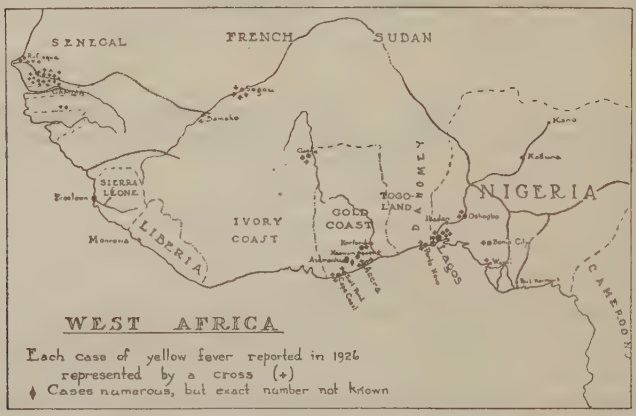
For the relief and control of hookworm assistance of various kinds has been given to 10 countries and administrations in tropical America and the West Indies; to Borneo, Ceylon, Java, the Madras Presidency, Malacca, Siam, certain Western Pacific Islands; Seychelles; and to mines in Spain. Research confirmed by experience has shown that the control of hookworm is, like most other big things, a much more critical business than hasty enthusiasts imagine; and also that permanent control of this parasite, as of other things of the same sort, will have to come in the general train of orderly sanitary progress. (Incidentally it has been observed in Panama that sea-water, which aborts the eggs of Ancylostoma, has no detrimental effect upon the eggs of Ascaris).

Aid has been given in multifarious forms—surveys, demonstrations, epidemiological studies, anti-mosquito operations—towards the control of malaria in Corsica, Italy, Poland, Spain, Argentina, Brazil, Nicaragua, Panama, Porto Rico, and the Philippine Islands. In Argentina the most dangerous mosquito appears to be *Anopheles pseudopunctipennis*, and in Porto Rico *A. albimanus*. In Spain the most heavily infected province is said to be Caceres. In dealing with larvae Paris green has been much used, and in Corsica the use of the Cyprinodont fish Gambusia "also met with interesting results;" but as the only instance of these results, as here recorded, was observed in an artificially isolated breeding-place examined ten days after the introduction of the fish, one is not much impressed by their tenour since it is well-known that under chosen conditions fish and

other natural enemies are marvellously destructive to larvae. In the United States the control of malaria in rural areas was taken up by the Board, and it is interesting to note the admission that the results are not expected to be spectacular.

A recrudescence of yellow fever in Brazil, due, it is said, to the passage of troops in pursuit of rebels through an old yellow fever area, has necessitated the resumption of anti-larva work in some larger centres of population and in smaller towns on frequented highways. Control stations were also maintained in some of the cities of the coast. Great activity is reported by the West Africa Yellow Fever Commission; the laboratory has been completed, surveys have been made, cases seen, and data of all kinds collected. *Aëdes aegypti* (=*argenteus*) appears everywhere to be present in sufficiently ominous numbers, particularly in the country round about Ibadan. Attempts to isolate an infective organism have not succeeded. [Since the publication of the report news has been received that although the organism still remains in hiding, the disease has been transmitted from man to monkey by inoculation of blood, and from monkey to monkey both by blood and by the intermediation of *Aëdes argenteus*].

One-sixth of the descriptive pages of the Report is devoted to rural



Map of West Africa showing areas from which yellow fever was reported in 1926.

[Reproduced from the *Annual Report of the International Health Board of the Rockefeller Foundation for 1926*.]

hygiene, towards the developmnet of which the Board has rendered assistance in many countries, though in its breathless enthusiam for the subject the Report does not always clearly indicate the nature and extent of the Board's responsibilities. It is distinctly stated that the Board contributed towards the organization of rural public health services of various kinds in Austria, Czechoslovakia, France, Hungary, Poland, and to 84 rural "health units" in the U.S.A.; again in the detailed description of the first rural "health unit" established in Ceylon it is stated that the Government of Ceylon provides all funds for the support of the unit, except a few subordinates' salaries which are paid by a local municipality; but in the cases of Canada, Brazil, Madras, Nicaragua, and Porto Rico the necessary sources of financial nourishment are not at all clearly defined.

As regards the administrative range of a rural "health unit" in a tropical area we may consider the unit recently established at Jasin, in the Straits Settlements, by agreement between the local Government and the Board. Its duties include control of communicable diseases, vaccination and prophylactic inoculations; clinics for treatment of venereal diseases, yaws,

hookworm, and malaria ; maternity and infant welfare ; hygiene of childhood and school ; popular instruction in hygiene ; and vital statistics. For staff there is provided a district health officer, who is also in medical charge of the local hospital ; a dresser, who is also vaccinator and can do routine microscope work ; a native public health nurse, holding also a certificate in midwifery : 3 sanitary inspectors and a caretaker ; and a part-time microscopist who will do the laboratory work for the hospital and district. The health unit in Ceylon, with a personnel of directing medical officer, 3 nurses, 3 midwives, and 6 sanitary inspectors, is said to have carried out a similar programme satisfactorily.

Under the general heading of central public health organization assistance has been given to many States of the U.S.A. and to several governments of Central America and of Europe. Here is included sanitary engineering (water-supplies, sewage disposal, malaria control), the study and control of epidemics, bureaus of vital statistics, public health laboratories, and assistance to advisory boards and agencies for sanitary reform.

Expenditure on public health education includes aid to schools and institutes of hygiene in London, Harvard, Peking, Brazil, Canada, Trinidad, Czechoslovakia, Denmark, Hungary, Norway, Poland and Jugoslavia ; travelling grants to public health officials in the States, Canada, and Europe; travelling fellowships to the number of 170, and 83 resident fellowships ; and grants to institutes for the training of public health nurses in Brazil and France.

Finally, in co-operation with the League of Nations, the Board has contributed to study tours (and interchanges) of medical and sanitary officers and sanitary engineers, and to the working of the international epidemiological and public health intelligence service, with particular mention of the Eastern Bureau in Singapore, which serves a vast tract extending more than halfway round the globe from Capetown and Alexandria on the west to Hawaii and Tahiti on the east.

A. Alcock.

DE LANGEN (C. D.). Beri-Beri. Een klinische studie van voeding en ziekte in Nederlandsch-Indië. [**Beriberi. A Clinical Study of Nutrition and Disease in the Dutch East Indies.**]—pp. vii+272. With 2 charts & 1 map in text. 1927. 's-Gravenhage : G. Naeff.

In this study de Langen lays stress upon the importance of clinical observation and classification for the solution of the beriberi problem. Though thoroughly convinced of the vitamin deficiency theory, he thinks that it has been too readily accepted and therefore offers many weak points for the arguments of its opponents. What has been described in the literature as beriberi by no means represents one clinical entity. Polyneuritis from other causes has been taken for beriberi in countries where this disease is endemic and very possibly the liability of rice-eating populations to toxic or infectious polyneuritis may be explained by the relative lack of vitamin B in the diet. On the other hand the increased metabolism under influence of fever in infectious diseases may hasten or cause the outbreak of beriberi by the higher demand on the vitamin stock of the organism. A well defined limitation of what is to be understood by beriberi is necessary. Most value is attached by the author to the symptoms presented in epidemics occurring as local explosions in groups of individuals living under the same conditions (institutions, ships, etc.). In sporadic cases the uniformity of the cause of the disease is not so well established.

The author distinguishes the more common hydropic type and the primary atrophic type, which latter must be distinguished from the cases in which the oedema, though primarily present, has disappeared, either spontaneously or under the influence of rest. The principal symptoms are : (1) Oedema, generally of the legs and in a lighter degree of the face ;

(2) peripheral paresis or paralysis of the legs (only in serious cases extending also more or less to the arms), with sensory disturbance but without tenderness of the nervous trunks; and (3) cardiac symptoms (increasing rapidity of the pulse, increased action of the heart, dilatation, and lastly hypertrophy or paralysis). Polyneuritis without cardiac symptoms is not beriberi. Based to a great extent upon the writer's own researches, the application to beriberi of modern clinical methods is discussed in detail (haematology, chemistry of blood and urine). In connexion with the significance of rice in the spread of beriberi rice cultivation in its economical and technical aspects (methods of polishing, storage, etc.) is considered and the tests in use for standardization of rice in respect of its vitamin content are reviewed (determination of phosphorus content, alcohol test, biological test with rice birds or pigeons). In a chapter on experimental biological work on avitaminosis-B the author distinguishes (1) the disease caused in birds by exclusive feeding of polished rice, (2) the avitaminosis-B *sensu strictiori* and (3) actual beriberi. Though denying the identity of these conditions, far from rejecting any connexion like Megaw he thinks they are intimately related, and in their future study he expects much of experiments with the pure vitamin B, lately isolated by Jansen and Donath. Other theories are criticised (exclusive or mixed infection and intoxication theories, either with or without recognition of a part played by avitaminosis).

Finally, the author develops his ideas of the pathogeny of beriberi; he attributes much value to the lipoid metabolism; the ultimate cause he considers to be an alteration of the "coefficient lipocytique" (Maijer and Schaeffer). Such a change may be easily repaired, as is seen in the prompt response of beriberi to adequate dietetic treatment. Clinical as well as experimental evidence, in the author's opinion, point to the existence of a separate anti-oedema vitamin (present, e.g., in butterfat).

De Langen has done good service by this deserving attempt to stress the clinical study of beriberi, which has long been more or less neglected under influence of the great interest attached to laboratory work.

W. J. Bais.

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Am. signifies Amoebiasis and Amoebic Dysentery.
Bb. ,, Beriberi.
Bl. ,, Blackwater.
B.R. ,, Book Review.
Chl. ,, Cholera.
C.Bu. ,, Climatic Bubo.
Der. ,, Tropical Dermatology.
Dys. ,, Dysentery (Bacillary and Unclassed).
Ent. ,, Enteric Fevers.
Fev. ,, Fevers.
G.V. ,, Granuloma Venereum.
Hel. ,, Helminthiasis.
Hist. ,, Historical.
H.S. ,, Heat stroke .
Jaun. ,, Infectious Jaundice.
K.A. ,, Kala Azar.
Lab. ,, Laboratory Reports.
Lep. signifies Leprosy.
Mal. ,, Malaria.
Misc. ,, Miscellaneous.
Myc. ,, Tropical Mycology.
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Pel. ,, Pellagra.
Pl. ,, Plague.
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R.F. ,, Relapsing Fever and Other Spirochaetoses.
Sc. ,, Scurvy.
Sp. ,, Sprue.
S.S. ,, Sleeping Sickness.
Tb. ,, Tuberculosis.
Und. ,, Undulant and Abortus Fever.
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Y. & S. ,, Yaws & Syphilis.
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——, with Moore, 111 (Und.)
Carpenter, G. D. H., 561, 953 (974) (S.S.)
Carr, H. P., 195 (Hel.)
Carrere, J., 395 (Z.)
Carsten, M., 535 (Hel.)
Carter, H. F. (73) (Misc.)
Carvaillo, R., & Sautet, J., 18 (Am.)
Casaux & Houdemer, 526 (Hel.)
Cassar, with Anderson & Broc, 445 (Der.)
Castellani, A., 88 (R.F.), 157, 240 (Misc.), 319 (Myc.).
——, & Taylor, F. E., 677 (Misc.)
Castex, M. R., 6 (Am.)
——, & Greenway, D., 6 (Am.), 203 (Hel.)
Castillo Odena, I., 537 (Hel.)
de Castro, A. B., 260 (Mal.), 895 (Z.)
Castro Paullier, V., & Errecart, L., 557 (Lep.)
Catanei, A., 151 (Misc.), 701 (R.F.)
——, Grosdemange, L., & Legroux, C., 445 (Der.)
——, with Montpellier, 320 (Myc.), 446 (Der.)
——, with Sergent, Et. (285) (Mal.)
Catasús, J. M., with Vilanova, 920 (Lep.)
Cawston, F. G., 174, 516, 517, 985, 986, 987 (Hel.)
Cazanove, F., 718 (Y.F.), 996 (Hel.)
Cazeneuve, H. J., 934 (Pl.)
Céard, L., 308 (Y. & S.)
Ceccherelli, R., 223 (Rab.)
Cecil, R. L., with Baldwin, 487 (Misc.)
Celli, A., 350 (Hist.), 411 (B.R.)
Cénac, M., with Claude & Targowla, 752 (Mal.)
Cendali, G., 555 (Lep.)
——, with Franchini, 554 (Lep.)
Centeno, A. M., with Bonorino Udaondo, 783 (Am.)
Cerqueira, A., 700 (R.F.)
Cerrutti, C., 118 (Und.)
Chachina, S., 224 (Rab.)
Chadwick, C. R., & McHattie, C., 648 (K.A.)
Chagas, C., 966 (S.S.)
Chahovitch, X., 129 (Sc.)
Chaigneau, Y., 996 (Hel.)
Chalam, B. S. (409), 425, 882 (Z.)
——, with Young, 889 (Z.)
Chand, K., with Shortt, Craighead & Swaminath, 637 (K.A.)
Chand, W. (51) (Ent.)
Chandler, A. C., 174, 190, 191, 538, 990, 1003 *bis* (Hel.)
——, & Chopra, R. N., 235 (Misc.)
Channon, H. A., 24 (Dys.)
——, & Wright, H. D., 591 (S.S.)
Chapin, E. A., 401 (Z.)
Charles, R. H., 503 (B.R.)

Charrier, H., & Remlinger, P. (758) (Mal.)
Chastel, with Pons, 218 (Lep.)
Chatridse, I., 789 (Am.)
Chatrieux, H., 662 (Bl.)
Chatterjee, G. C. (903) (Z.)
Chatterjee, N., 237 (Misc.)
Chatterjee, S. C., 23 (Dys.)
Chatterji, D. M., 975 (Hel.)
Chatterji, K. K., 503 (B.R.)
Chaves, J. A., 830 (Misc.)
Chen, K. K., & Hsiang-Chuan Hou, 511 (Hel.)
Cheng Fang Tsu, 177 (Hel.)
Chenoy, C. F., 236 (Misc.)
Child, H. J., 391 (Z.)
Choay, A. (856) (Misc.)
Chopra, R. N., (856) (Misc.)
——, with Chandler, 235 (Misc.)
——, & De, P., 234 *bis*, 235 (Misc.)
——, with Ghosh, N. N., 233 (Misc.)
Choudhury, K. L., with Strickland, 772 (B.R.)
Chowdhury, K. L., with Strickland, 883 (Z.)
Choy, P. D., 353 (Am.)
Christophers, S. R., & Sinton, J. A., 253 (Mal.)
——, ——, & Covell, G., 881 (Z.)
Christopherson, J. B., 517 (Hel.)
Churchill, F. S., Landis, E. M., & Glusker, S. D., 119 (Fev.)
Chun, J. W. H. & Wu Lien Teh, 597 (Bb.)
Chyurlia, N., 319 (Myc.)
Cilento, R. W., & Backhouse, T. C., 512 (Hel.)
Ciotola, A., & Alongi, G., 760 (Rab.)
Clara, P., 256 (Mal.)
Clark, H. C., 232 (Misc.), 732 (Mal.)
Claude, H., Targowla, R., & Cénac, M., 752 (Mal.)
Clay, C. L., with Solomon, Berk, & Theiler, 92 (Fev.)
Clayton, F. H. A., 22, 367 (Dys.)
Cleare, Jr., L. D., 878 (Z.)
Clément, R., 317 (C.Bu.)
Cleveland, A. J., with Barton-Fanning, 100 (Jaun.)
Cleyndert, Jr., P. C., 706 (Jaun.)
Clifford, S. H., 26 (Dys.)
Cochez, with Meslay, 784 (Am.)
Cochrane, R. G., 209, 212, 214, 911 (Lep.), 943 (B.R.)
Coelho, J. G., 218 (Lep.)
Cohen, J. B., with Browning, Ellingworth & Gúlbransen, 573 (S.S.)
Colas-Belcour, J., with Roubaud, 885, 888 (Z.)
Cole, A. F., 1011 (Oph.)
Cole, H. A. (679) (Misc.)
Coleman, R. B., 174 (Hel.)
Coles, A. C., 87 (R.F.)
Collier, W. A., with Kudicke, 579 (S.S.)
Collin, L., 1014 (Oph.)
Collon, N., with Bruynoghe, 691 (R.F.)
Compte-Rendu du Premier Congrès International du Paludisme, Rome, 771 (B.R.)
Connal, A., 434 (Z), 815 (Lab.)
——, with Aitken, Gray & Smith, 101 (Y.F.)
Connor, F., 994 (Hel.)
Conoor, Southern India, 230 (Rab.)
Conos, B. (73) (Misc.)
Conseil, E., with Durand, 934 (Pl.)
——, with Nicolle, 451 (Der.)
Cook, A. R., & Stones, R. Y., 149 (K.A.)
Cook, C., 548 (Lep.)
Cooke, W. E., with Low, 632 (K.A.)
Cool, P., 908 (Lep.)
Cooley, T. B., & Lee, P., 670 (Misc.)
Cooper, G. W., with Wells, 152 (Misc.)
Cordes, W., 452 (Der.), 985 (Hel.)
Cordier, G., 970 (S.S.)
Cormack, J. G. (73) (Misc.)
Cornwall, J. W., 51 (Ent.), 230 (Rab.)
——, & Beer, W. A., 51 (Ent.)
Corrêa, C., with Pessoa, 871 (Z.)
——, with ——, & da Silveira, 523 (Hel.)
Cort, W. W., Grant, J. B., Stoll, N. R., & others, 193 (Hel.)
——, with Stoll & Kwei, 981 (Hel.)
Cosimo, B. V., 669 (Bl.), 703 (Fev.)
Cossio Etchecopar, M., with Mazza, 529 (Hel.)
da Costa, P., 843 (Misc.)
Costa, S., Boyer & Placidi, L., 766 (Rab.)
da Costa, S. F. G., 168 *ter*, 1001 (Hel.)
Coudray, F. E. C., 337 (Hist.)
Coughlin, W. F., with Shattuck & Little, 315 (G.V.)
Courtis, B., 890 (Z.)
Courtois-Suffit, Garnier & Liège, 111 (Und.)
Cousin, G., 432 (Z.)
Coutelen, F., 524 (Hel.)
Coutinho, E., 729 (Mal.)
Couto, M., 125 (Bb.), 729 (Mal.)
Couvy, L., 718 (Y.F.)
Covell, G., 881, 884 (Z.), 942 (B.R.)
——, with Christophers & Sinton, (881) (Z.)
Covey, G. W., 390 (Z.)
Cowdry, E. V., 762 (Rab.)
Cowen, S. O., 382 (Sp.)
Cox, W. C., 900 (Z.)
Coyne, A. E., 601 (Bb.)
Craig, C. F., 18, 351, 364 (Am.)
——, & St. John, J. H., 351 (Am.)
Craighead, A. C., with Barraud & Shortt, 636, 638 (K.A.)
——, with Shortt & Barraud, 132 *bis*, 133, 134 (K.A.)
——, with — , Chand & Swaminath, 637 (K.A.)
Cramer, B., with Fuchs, Ferro & Puiggari, 1012 (Oph.)
Crampon, P., with Duhot & Lefèbvre, 181 (Hel.)
Crawford, M., 768 (Rab.)
Cremona, P., & Serravalle, G., 763 (Rab.)
Creyx & Bonnel, 97 (Jaun.)
Crimmins, M. L., 406 (Z.)
Crocco G., & Lottico, S., (922) (Lep.)
Crouch, H. A., with Whitehead, 95 (Jaun.)
Cruciani, J. A., with Viton & Vivoli, 698 (R.F.)
Cruickshank, M. M., 479, 1015 (Oph.)
Cruto, A., with Trocello, 233 (Misc.)
Cruz, O., with de Faria, 875 (Z.), 966 (S.S.)
Cuboni, E., 278 (Mal.)
Cumming, H. S., 729 (Mal.)
Cumpston, J. H. L., & McCallum, F., 929 (Pl.)
Cunningham, J., Nicholas, M. J., & Lahiri, B. N., 229 (Rab.)
——, & Theodore, J. H., 694 (R.F.)
Curson, H. H., 640 (K.A.)

D

Dabbadie, (73) (Misc.)
Dalal, C. M., 994 (Hel.)
Dalmeyer, J. J., 12 (Am.)

Dante, F., 277 (Mal.)
Dantrelle, 1016 (Oph.)
Dargein, G., & Doré, G., (679) (Misc.)
Darleguy, with Vialard, 8, 799 (Am.)
Dascalopoulos, N., 1011 (Oph.)
Datta, J. K., 247 (Misc.)
Daubney, R., 164 (Hel.)
——, with Baylis, 249 (B.R.)
Daude, J., with Ledentu, 565 (S.S.)
David, H., 927 (Chl.)
——, with Schnürer, 769 (Rab.)
Davie, T. M., 289 (Pel.)
Davies, D. S., 508 (Hel.)
Davies, G. R., 763 (Rab.)
Davies, J. H. T., 212 (Lep.)
Davies, R. M., with Newman, 14 (Am.)
Davis, L. J., & Brown, H. C., 968 (S.S.)
Davis, N. C., 725 (Mal.)
Dawson, W. R., 684 (B.R.)
De, P., with Chopra, 234 *bis*, 235 (Misc.)
De, S. N., 66 (Misc.)
Dear, W. R., 1012 (Oph.)
Debré, R., & Petot, C., 809 (Pel.)
Deggeller, O., 598 (Bb.)
Delamare, G., 91 (R.F.), (285) (Mal.)
——, & Achitouv, 88 *bis* (R.F.)
Delancë, P., 380 (Dys.)
De la Rivière, D., with Brodin, 95 (Fev.)
Delgado, L. B., with Nicolas, 551 (Lep.)
Delord & Villard, 1019 (Oph.)
Delorme, M., 450 (Der.)
Dembo, L. H., Ruh, H. O., Fargo, W. C., & Taylor, G. R., 93 (Fev.)
Demjanow, G. G., 733 (Mal.)
Demjanow, G. S., 263 (Mal.)
Den Hartog, B. J. C., 156 (Misc.)
Denney, O. E., 219 (Lep.)
Derkatsch, W. S., 926 (Chl.)
Derrien, E., 524 (Hel.)
——, with Lemaire & Thiodet, 523 (Hel.)
Deschiens, R., 385, 392, (410), 867 (Z.), 790 (Am.)
Destéfano, F., & Vaccarezza, R. F., 72 (Misc.)
Dévé, F., 524 (Hel.)
Devesa, 31 (Dys.)
Dew, H. R., 180 (Hel.)
Dickinson, R. F. O'T., 258 (Mal), 872 (Z.)
Dideboulidzé, G., with Makhirladzé, 543 (Hel.)
Didebuladze, with Makhirladze, 509 (Hel.)
Dilling, W. J., 247 (Misc.)
Dimitri, V., 261 (Mal.)
Dimitroff, V. T., 714 (Jaun.)
Dingmann, A., 1003 (Hel.)
Dios, R. L., with Mühlens, Petrocchi & Zuccarini, 682 (B.R.)
——, Zuccarini, J. A., & Werngren, E. T., 390 (Z).
Dircks-Dilly, J., & Bonnel, F., 804 (Dys.)
Dive, G. H., 626 (Fev.)
Dixon, P. K., 307 (Y. & S.)
Djokič, A., & Stambuk, D., 738 (Mal.)
Dobell, C., 307 (Y. & S.)
——, & Laidlaw, P. P., 363 (Am.)
Dobronravov, W., 450 (Der.)
Dodds, E. C., with Baker, 664 (Bl.)
Dogiel, V., & Fedorowa, T., 388 (Z.)
Domingo, P., & Vidal, J., 50 (Ent.)
di Domizio, G., 595 (S.S.)
Donaldson, A. W. H., 687 (R.F.)
Donath, J. & Heilig, R., 282 (Mal.)
Donath, W. F., with Jansen, 126, 607, (608) (Bb.)
——, with Mengert-Presser, 855 (Misc.)
——, ——, & Oudendal, A. J. F., 490 (Misc.)
Donatien, A., with Parrot, 141, 647 (K.A.)
——, with Sergent, Edm. & Et., & Béguet, 649 (K.A.)
——, with ——, Parrot & Béguet, 140 (K.A.)
——, with Sergent, E.,——, & Lestoquard, 387 (Z.)
Doorenbos, W. B., 880 (Z.)
Dopter, C. A. H., 782 (Am.)
Doré, G. R., 379 (Dys.)
van Dorssen, J. H. M., 344 (Hist.)
Dostrowsky, A., 641 (K.A.)
Dowling, O., 729 (Mal.)
Drensky, K., & Hegner, R. W., 398 (Z.)
v. Drigalski, W., & Koch, E. W., (544) (Hel.)
Driver, J. R., Gammel, J. A., & Karnosh, L. J., 279 (Mal.)
Dubois, A., 584 (S.S.), (856) (Misc.)
—— & Bouckaert, J. P., 585 (S.S.)
——, with Bruynoghe, 571 (S.S.)
——, with ——, & Bouckaert, 971 (S.S.)
——, with —— & de Greef, 693 *bis* (R.F.)
del Duca, D., 1001 (Hel.)
Duchon, L., with Flandin, 9 (Am.)
Duffie, H., 612 (Und.)
Duhot, E., Crampon, P., & Lefèbvre, J., 181 (Hel.)
Duke, H. L., (51) (Ent.), 814 (Lab.), 945, 947, 949 (S.S.)
Dumas, with Rigollet, Motais, Le Dentu, Lasnet & Camail, 160 (B.R.)
Dumas, R., 204 (Hel.)
Dungal, N., 795 (Dys.)
Dunlap, A. M., 137 (K.A.)
Dunn, L. H., 424, 897 (Z.)
Dunscombe, W. K., 921 (Lep.)
Dupuy, L., (73) (Misc.), 744 (Mal.), 788 (Am.)
Duque, H., 729 (Mal.)
Durand, P., 245 (Misc.), 514 (Hel.)
——, Anderson, C., & Lumbroso, U., 245 (Misc.)
——, & Conseil, E., 934 (Pl.)
——, & Lumbroso, U., 244 (Misc.)
Durham, F. M., Marchal, J., & King, H., 572 (S.S.)
du Toit, P. J., with Theiler, 386 (Z.)
Dutt, A. M., with Brahmachari, 635 (K.A.)
Duval, with Guillement, 738 (Mal.)
Duwez, J., with Houssiau, 267 (Mal.)
Duyck, 236 (Misc.)
Dwijkoff, P., 585 (S.S.)
Dwyer, J. P., with McCallum, 627 (Fev.)

E

Early, P. V., 200 (Hel.)
Edwards, F. W., 421 (Z.)
Efremowa, N., with Ioff, 894 (Z.)
Eggers, H., 496 (Misc.)
Eguchi, S., 203 (Hel.)
——, with Hayashi, Oshima & Hozumi, 624 (Fev.)
Egypt, 1020 *bis* (Oph.)
Eichelbaum, H. R., 152 (Misc.)
Eichholtz, F., 738 (Mal.)
Eiselberg, K. P., 741 (Mal.)
Eisler, M., & Kovács, N., 467 (Chl.)

El Bakry, M. M., 482 (Oph.)
Elders, C., 382 (Sp.)
Eliascheff, O., with Jeanselme, 310 *bis* (Y. & S.)
Elkeles, G., 792 (Dys.)
——, & Schneider, A., 24, 792 (Dys.)
Ellingworth, S., with Browning, Cohen & Gulbransen, 573 (S.S.)
Elliott, R. H., 477 (Oph.)
Emile-Weil, P., 986 (Hel.)
——, & Stieffel, 654 (Bl.)
Emily, 161 (Hel.)
Endo, M., with Tanaka, 599 (Bb.)
Endo, N., with Yabe, 607 (Bb.)
Engel-Bey, F., 216 (Lep.)
Enrico, C., 617 (Und.)
Eroussalimtchique, G. L., with Gloukhoff, Wolkowa & Panine, 372 (Dys.)
Errecart, L., with Castro Paullier, 557 (Lep.)
Eschbach, H., 148 (K.A.)
Escomel, E., 392 *bis* (Z.)
Escudero, A., with Escudero, P., & Peco, 522 (Hel.)
Escudero, P., Escudero, A., & Peco, G., 522 (Hel.)
Espié, A., 190 (Hel.)
——, with Juillet, 543 (Lep.)
Esquier, 549 (Lep.)
Esquivel, R., & Lasta, C. G., 763 (Rab.)
Eubanas, F., 271 (Mal.)
Evans, A. C., 611, 614 (Und.)
——, with Francis, 116 (Und.)
Evtikhiev, A., (940) (Pl.)

F

Faggioli, R., 890 (Z.)
Fahim Girgis Ibrahim, 472 (Oph.)
Fairley, N. H., 175, 176, 517, 518 (Hel.)
——, & Jasudasin, F., 518 (Hel.)
——, & Mackie, F. P., 175 (Hel.)
Fajardo, J., Lopez-Rizal, L., & Padua, R. G., 284 (Mal.)
Falleroni, D., 424, 426, 859 *bis* (Z.)
Far Eastern Association of Tropical Medicine, 506 (Misc.), 599 (Bb.)
Fargo, W. C., with Dembo, Ruh & Taylor, 93 (Fev.)
de Faria, G., & Cruz, O., 875 (Z.), 966 (S.S.)
Farjot, A., with Melnotte, 855 (Misc.)
Fauqué, M. C. J. (679) (Misc.)
Faust, E. C., 170, 507, 532 (Hel.), 251 (Mal.), 385 (Z.)
——, & Ke-Fang, Z., 172 (Hel.)
——, & Khaw, O. K., with Ke-Fang, Y. & Yung-an, C., 983 (Hel.)
——, & Nishigori, M., 512 (Hel.)
Faust-Newton, C., 290 (Pel.)
Favilli, G., 113 (Und.)
Federated Malay States, 723 (Mal.)
Federated Malay States, Rep. Inst. Med. Res., 819, 820 (Lab.)
Fedorowa, T., with Dogiel, 388 (Z.)
Fedulow, A. W., 865 (Z.)
Feigenbaum, A., 473 (Oph.)
Felt, E. P., 419 (Z.)
Ferguson, E. W., 890 (Z.)
Fermi, C., 427 (Z.), 770 (Rab.)
Fernandez, A. A., 150 (Misc.)
Fernández, L., with Lopez-Rizal & Gutierrez, 296 (Y. & S.)
Fernán-Núnez, M., 979 *bis*, 1002 (Hel.)
Ferro, with Fuchs, Puiggari & Cramer, 1012 (Oph.)
Fialho, A., 729 (Mal.)
Fielding, J. W., (903) (Z.)
Filho, P., 320 (Myc.)
Finaly, R., 1000 (Hel.)
Finocchio, M., with Volpino, 228 (Rab.)
Finzi, G., 110 (Und.), 227, 769 (Rab.)
Fischer, O., (51) (Ent.), 738, 745, 746 (Mal.)
——, with Mühlens, 738 (Mal.)
Fischer, W. O. & Orenstein, A. J., 1004 *bis* (Hel.)
Fisher, C. F., & Bittinger, W. P., 188 (Hel.)
Flandin, C., & Duchon, L., 9 (Am.)
Fleisher, M. S., with Kotkis & Wachowiak, 319 (Myc.)
Fleming, W. D., with Shepard, 384 (Sp.)
Fletcher, W., & Kanagarayer, K., 794 (Dys.)
——, & Lesslar, J. E., 122, 123 *bis* (Fev.)
Fleury, G., 482 (Oph.)
Flu, P. C., 835 (Misc.)
Flury, F., & Léeb, F., 513 (Hel.)
Foà, G., 733 (Mal.)
Foley, H., with Parrot, (149) (K.A.)
——, with Sergent, Edm. & Et., & Parrot, 641 (K.A.)
da Fonseca, O., 872 (Z.)
——, & Muniz, J., 396 (Z.)
Forrest, S., (856) (Misc.)
Foster, P., 636 (K.A.)
——, with Napier, 636 (K.A.)
Foulon, with Liégeois, 157 (Misc.)
Fourneau, E., Tréfouël, M., & Mme. & de Lestrange-Trévise, 674 (Misc.)
Fowler, C. E. P., 755 (Mal.)
Fox, E. C. R., 230 (Rab.)
Fox, H., 313 (G.V.)
França, C., 140 (K.A.), 177, 178 (Hel.), 329 (Hist.)
Franchini, G., 8 (Am.), 431 (Z.), 750, 756 (Mal.)
——, & Cendali, G., 554 (Lep.)
Francis, E., & Evans, A. C., 116 (Und.)
Frankenberger, C., 854 (Misc.)
Fraser, A. M., Kinloch, J. P., & Smith, J., 367 (Dys.)
Fraser, D. M. M., with McCall-Smith, 802 (Dys.)
Freeborn, S. B., 876 (Z.)
Freeman, W., 751 (Mal.)
Freiman, M., 742 (Mal.)
Frew, A., & Butt, H. T. H., 48 (Ent.)
Frias, D., with Mazza, 400, 894 (Z.)
Frimodt-Möller, C., 492 (Misc.)
Frise, W., Sdrodowskii, P., & Minervin, S., 613 (Und.)
Fronville, G., 744 (Mal.)
Fuchs, E., Ferro, Puiggari, I., & Cramer, B., 1012 (Oph.)
Fujii, T., Saito, S., & Shionoya, H., 203 (Hel.)
Fujimaki, Y., & Matsumuro, H., 604 (Bb.)
Fujimoto, A., with Torikata, 796 (Dys.)
Fujinami, A., 519 (Hel.), (608), (Bb.)
Fülleborn, F., 187, 198, 527, 528, 529, 532, 540, 993, 1008 (Hel.), 450 (Der.)
Fulton, R. A. H., 520 (Hel.)
Fulton, M. N., & Berry, G. P., 797 (Dys.)
Funke, J., 366 (Am.)

Futaki, K., 370 (Dys.)
——, Takaki, I., Taniguchi, T., Ohsumi, S., Ishiwara, K., & Ohtawara, T., 702 (Fev.)

G

Gabarrou, F. G., 743 (Mal.)
Gabbi, U., 855 (Misc.)
Gabrielidès, C., 1014 (Oph.)
Gaehlinger, H., 69 (Misc.)
Gage, E. E., & Gregory, D. A., 111 (Und.)
Gaglazov, B. G., 120 (Fev.)
Gaiski, N., 32 (Pl.)
Gaïsky, N. A., (940) (Pl.)
——, & Alfionov, S., 32 (Pl.)
Galloway, D. J., 704 (Jaun.)
Galloway, I., with Levaditi & Nicolau, 569 (S.S.)
Galloway, S. A., with Mathis, 87 (R.F.)
Galouzo, J. G., with Yakimoff, Rastégaïf & Loukianoff, 873 (Z.)
Gamble, C. J., 282 (Mal.)
Gammel, J. A., & Karnosh, with Driver, 279 (Mal.)
Gardner, F., & Brown, A. K., 71 (Misc.)
Garin, G., 394 (Z.)
Garmatty, K. I., with Semionow, 982 (Hel.)
Garnier, with Courtois-Suffit & Liège, 111 (Und.)
Garrone, E., 735 (Mal.)
Gaté, J., & Billa, M., 696 *bis* (R.F.)
Gavino, C., 462 (Chl.)
Gay, D. M., & Branch, A., 438 (Z.)
——, with ——, 994 (Hel.)
Geiger, J. C., with Kaplan & Williamson, 780 (Am.)
van Gelder, A. H., 96 (Jaun.)
Génevray, 203 (Hel.)
Genevray, J., with Morin, 80 (R.F.)
Georg, C. T., 855 (Misc.)
de Georges, L. V., 229 (Rab.)
Gerbasi, M., 703 (Fev.), 778 (Am.)
Gerber, C. W., 769 (Rab.)
Germain, L., & Neveu-Lemaire, M., 439 (Z.)
German, O. A., 225 (Rab.)
German, S. G., 536 (Hel.)
Ghiron, M., 657 (Bl.)
Ghosh, N. N., with Chopra, 233 (Misc.)
Giacosa, R. A., with Staffieri & Barralt, 997 (Hel.)
Giemsa, G., 738 (Mal.)
——, Weise, W., & Tropp, C., 272 (Mal.) 399 (Z.)
Giese, C., 226 (Rab.)
Giglioli, G., 703 (Fev.), (903) (Z.)
Giglioli, M., (410) (Z.)
Gill, C. A., 863 (Z.)
Gioseffi, M., 285 (Mal.) (410) (Z.)
Girard, G., 934 (Pl.)
——, & Robic, J., 762 (Rab.)
Giuffré, M., 614 (Und.)
Glaser, R. W., 679 (Misc.)
Glénard, R., (73) (Misc.)
Glökler, F., 157 (Misc.)
Gloukhoff, K. T., Wolkowa, E. A., Eroussalimtchique, G. L., & Panine, L. G., 372 (Dys.)
Glusker, S. D., with Churchill & Landis, 119 (Fev.)
Goeckerman, W. H., with O'Leary & Parker, 279 (Mal.)
Goldberger, J., 290 (Pel.)
——, & Wheeler, G. A., 811 (Pel.)
Gold Coast, Ann. Rep. Med. Res. Inst., 817 (Lab.)
Golov, D., & Ioff, I., 434 (Z.)
Golov, D. A., & Joff, I. G., 937 (Pl.)
Gomes, J. M., 921 (Lep.)
——, & Pessôa, S. B., 699 (R.F.)
Gomperts, H. C., 530 (Hel.)
Gonsalves, N. B., 227 (Rab.)
González, C., with Alvarado, 269 (Mal.)
Gonzalez Olaechea, M., 736 (Mal.)
Goodman, H., 304 (Y. & S.)
Gopalan, N., (680) (Misc.)
Gordon, R. M., 178 (Hel.)
——, with Blacklock, 861 (Z.)
Gorovits-Vlasova, L. M., 225 (Rab.)
Goubin, V., 926 (Chl.)
Goubine, V. M., 928 (Chl.)
Gourfinkell, M., 203 (Hel.)
Goyle, A. N., 932 (Pl.)
Gracias, E., with Nazareth & d'Araujo, 547 (Lep.)
Graf, E., 260 (Mal.)
Graham, J. D., 39 (Pl.), 923 (Chl.)
Grant, H. G., 729 (Mal.)
Grant, J. B., with Cort, Stoll & others, 193 (Hel.)
Gravot, 269 (Mal.)
Gray, A. M. H., 648 (K.A.)
Gray, G. A., 389 (Z.)
Gray, G. M., with Aitken, Connal & Smith, 101 (Y.F.)
Graziano, F., 633 (K.A.)
Graziosi, A., 616 (Und.)
de Greef, E., with Bruynoghe & Dubois, 693 *bis* (R.F.)
Green-Armytage, V. B., 156 (Misc.)
Greenbaum, S. S., 808 (Pel.)
Greene, E. F., 650 (Bl.)
Greenway, D., 395 (Z.)
——, with Castex, 6 (Am.), 203 (Hel.)
Gregory, D. A., with Gage, 111 (Und.)
Grigorieva, S. P., 749 (Mal.)
Grimes, C., 36 (Pl.)
Grönholm, V., 473 (Oph.)
Grosdemange, L., with Catanei & Legroux, 445 (Der.)
Grossmann, E., 274 (Mal.)
Grossmann, H., with Uhlenhuth, 97 (Jaun.)
de Grôsz, E., 476 (Oph.)
Gueidon, E., with Sergent, Et. & Pages, 648 (K.A.)
Guérin, F., with Bablet, Lalung-Bonnaire & Pons, 602 (Bb.)
——, Borel, E., & Advier, M., 743 (Mal.)
Guerrero, L. E., 546 (Lep.)
Guerricchio, A., 392 (Z.)
Guerrini, G., 933 (Pl.)
Guillement & Duval, 738 (Mal.)
Guillerm, J., with Bernard & Bablet, 602 (Bb.)
Guillet, R., 688 (R.F.)
——, with Jouenne, 552 (Lep.)
Guillon, A., 448 (Der.), 513 (Hel.)
——, & Kéruzoré, A., 737 (Mal.)
Gulbransen, R., with Browning, 965 (S.S.)
——, with ——, Cohen & Ellingworth, 573 (S.S.)

Gundrum, F. F., & Snyder, J. R., 525 (Hel.)
Gupta, B. M. D., 635 *bis* (K.A.)
Gupta, C. C. D., 373 (Dys.)
Gupta, T. P. S., 237 (Misc.)
Guthrie, A. C., 707 (Jaun.)
Guthrie, J. B., 292 (Pel.)
Gutierrez, A. F., with Gutierrez, 847 (Misc.)
Gutierrez, P. D., & Gutierrez, A. F., 847 (Misc.)
Gutierrez, P., with Lopez-Rizal & Fernandez, 296 (Y. & S.)
Guzmán, P. A., 187 (Hel.)
Guzmán Barrón, A., 122 (Fev.)

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Hachitani, T., Takita, J., & Shoetensack, M., 466 (Pl.)
Hadfield, G., with White, 807 (Pel.)
Hadwen, S., 431 (Z.)
v. Hahn, F. V., 129 (Sc.)
Hahn, M., & Hirsch, J., (47), 471 (Chl.)
Hakansson, E., with Bloedorn, (73) (Misc.)
Hakki, I., 885 (Z.)
Halfer, G., (680) (Misc.)
Haliapina, K., 229 (Rab.)
Hall, F., 911 (Lep.)
Hall, G. A. M., 10 (Am.)
Hall, M. C., 164, 165 (Hel.)
——, & Shillinger, J. E., 166, 167 (Hel.)
Hallé, J., & Mollaret, P., 783 (Am.)
Hamilton, R. G., 212 (Lep.)
Hamlyn-Harris, R., 878 (Z.)
Hanschell, H. M., 277 (Mal.), 667 (Bl.)
Hanson, H., 105 (Y.F.)
Hara, M., with Higuchi, Kondo, Narita & Matsuzawa, 605 (Bb.)
Hara, T., Takada, R., & Matsumuro, H., (608) (Bb.)
Hardenburgh, W. A., 729 (Mal.)
Hardy, T. L., & Savery, H. M., 702 (Fev.)
Harold, C. H. H., 420 (Z.)
Harris, R. H., 892 (Z.)
Harrison, C. H., 21 (Am.)
Hartman, E., 874 (Z.)
——, with Werner, 588 (S.S.)
Hartoch, O., Schlossberger, H., & Joffe, W., 371 (Dys.)
den Hartog, J. C., & van Steenis, P. B., 712 (Jaun.)
Harvard Institute for Tropical Biology and Medicine, 324 (B.R.)
Harvey, D., with Andrews, Manson-Bahr, Thomson, Neame & Moore, 958 (S.S.)
Hase, A., 404 (Z.)
Haslam, J. F. C., 538 (Hel.)
Hasley, D. E., with Huddleson & Torrey, 619 (Und.)
Hassall, A., with Stiles, 249 (B.R.)
Hasselmann, G., 874 (Z.)
Hasson, J., 212, 911 (Lep.)
Hatcher, R. A., & Weiss, S., 273 (Mal.)
——, with ——, (73) (Misc.)
Haughwout, F. G., 333 (Hist.)
Hausheer, W. C., & Herrick, C. A., 195 (Hel.)
——, ——, & Pearse, A. S., 197 (Hel.)
Hawley, P. R., 831 (Misc.)
Hayashi, N., Oshima, F., Eguchi, S., & Hozumi, K., 624 (Fev.)
Hayes, S. N., 361 (Am.)
Hayman, Jr., J. M., & Lynch, Jr., F. B., 708 (Jaun.)
Hayne, T. B., 729 (Mal.)
——, with Barber & Komp, 729 (Mal.)
Health, Melbourne, 61 (Misc.)
Hearle, E., 500 (B.R.)
Hegner, R. W., 276 (Mal.), 387 *ter*, 390, 870(Z.)
, with Drensky, 398 (Z.)
Heiling, R., with Donath, 282 (Mal.)
Heimberger, L. F., 309 (Y. & S.)
Hein, G. E., 978 (Hel.)
Heinemann, H., 603 (Bb.), 849 (Misc.)
——, & Heinemann, L., 239 (Misc.)
Heitzmann, O., 721 (Y.F.)
Hektoen, L., 204 (Hel.)
Henderson, J. M., 910 (Lep.)
Henning, with Steiner & Steinfeld, 83 (R.F.)
Henry, T. A., 911 (Lep.)
Hercelles, O., 624 (Fev.)
Hercus, C. E., 521 (Hel.)
Hermans, E. H., 309 (Y. & S.)
Hermitte, L. C. D., Sen Gupta, S. C., & Biswas, T. N., 30 (Dys.)
Herms, W. B., 433 (Z.)
Hernandez Bautista, D., 104 (Y.F.)
Heronimus, E. S., with Kritschewski, 582 (S.S.)
Herrera-Batteke, P. P., & West, A. P., 217 (Lep.)
Herrick, C. A., with Hausheer, 195 (Hel.)
——, with —— & Pearse, 197 (Hel.)
Herrmann, E., with Uhlenhuth, 711 (Jaun.)
Herrmann, O., 231, 765 *bis* (Rab.)
Herschendörfer, A., 474 (Oph.)
Herszky, P., 525 (Hel.)
Hertig, M., with Young, 133 (K.A.)
Herzfeld, G. M. A., & Mackie, T. J., 93 (Fev.)
Hess, H., 199 (Hel.)
Heydon, G. M., 167, 1007 (Hel.)
——, with Baldwin & Broben, 779 (Am.)
Heymann, P., 746 (Mal.)
Heymons, R., 439 (Z.)
Hicks, E. P., (940) (P.L.)
Higuchi, M., with Sugimoto, Yasuda, Momoyeda & Tanaka, 598 (Bb.)
Higuchi, T., 604 (Bb.)
——, Kondo, M., Hara, M., Narita, S., & Matsuzawa, K., 605 (Bb.)
Hiles, I., 521 *bis* (Hel.)
Hill, C. M., 391 (Z.)
Hill, R. B., 196, 200, 1004 (Hel.)
Himmelfarb, J. K., 939, 940 (Pl.)
Hindle, E., Hou, P. C., & Patton, W. S., 138, (K.A.)
——, & Patton, W. S., 137 138, 639 (K.A.)
——, with ——, 130, 639 (K.A.), 389, 428 (Z.)
Hingston, H., 65 (Misc.)
Hinshaw, H. C., (903) (Z.)
Hirai, M., 1001 (Hel.)
Hiraishi, S., with Koidzumi & Koino, 187 (Hel.)
Hiraishi, T., 998 (Hel.)
Hirsch, J., 45 *bis* (Chl.)
——, with Hahn, (47), 471 (Chl.)
Hirst, L. F., 453, 930 (Pl.)
Hirst, S., 898 (Z.)...
Hitti, J. K., 148 (K.A.)
Hoare, C. A., 20 (Am.)
Hodgson, E. C., 230 (Rab.), 630 (K.A.)
——, Vardon, A. C., & Singh, Z., 730 (Mal.)
Hodson, V. S., 736 (Mal.)

Hoeltzer, R., with Aristowsky, 84 (R.F.)
——, & Zabolotzkaja, T., 693 (R.F.)
Hoeppli, R., 991 (Hel.)
——, with Stepanow-Grigoriew, 527 (Hel.)
Hoffman, F. L., 729 (Mal.)
Hoffman, W. A., 409, 426 (Z.)
Hoffmann, W. H., 106, 107, 721, (722) *quat* (Y.F.), 549, 916, 918 (Lep.)
——, & Ramos Báez, P., 209 (Lep.)
Hofman, A., 689 (R.F.)
Homma, H., 159 (Misc.)
Honig, P. J. J., & Swellengrebel, N. H. H., 344 (Hist.)
van Hoof, L., 446 (Der.), 949, 950 (S.S.)
Hopkins, R., 211 (Lep.)
Hora, S. L., 898 (Z.)
Hörlein, H., 264 (Mal.)
Horowitz-Wlassowa, L., 523 (Hel.)
Horster, H., with Wiechmann, 83 (R.F.), 274 (Mal.)
Hoshizaki, S., 829 (Misc.)
Hosomi, S., & Yoshino, M., (758) (Mal.)
Hosoya, Y., with Yamazaki, 828 (Misc.)
Hou, P. C., with Hindle & Patton, 138 (K.A.)
Houdemer, with Casaux, 526 (Hel.)
Houssiau & Duwez, J., 267 (Mal.)
Houssiau, F., (285) (Mal.)
Howitt, B. F., 391 *bis* (Z.)
Hozumi, K., with Hayashi, Oshima & Eguchi, 624 (Fev.)
Hsiang-Chuan Hou, with Chen, 511 (Hel.)
Huddleson, I. F., Hasley, D. E., & Torrey, J. P., 619 (Und.)
——, & Winter, O. B., 620 (Und.)
Hudellet, (680) (Misc.)
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Huizenga, L. S., 91, 696 (R.F.), 549 (Lep.)
Hull, T. G., & Black, L. A., 609 (Und.)
Hume, E. E., 342 (Hist.)
Hung, S. L., 195 (Hel.)
Hunter, R. N., (51) (Ent.)
Huppenbauer, C. B., (73) (Misc.)
Hurry, J. B., 497 (Misc.)
Hurst, A. F., 377 (Dys.)
Hyvert, R., (680) (Misc.)

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Ibanez Puiggari, M., 1012 (Oph.)
Ichok, G., 335 (Hist.), 522 (Hel.)
Ignacio, M., with Sison, 50 (Ent.)
——, with Sison, A. G., Sison, A. B. M., & Navarro, 678.
Ignatiev, A., 935 (940) (Pl.)
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Ikuji, K., 534 (Hel.)
Illingworth, J. F., 401 (Z.)
Ilvento, A., (73) (Misc.)
Impey, S. P., 553 (Lep.)
Inada, R., 713 (Jaun.)
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Indian Medical Record, (559) (Lep.)
Infurna, G., 869 (Z.)
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——, & Pirie, J. H. H., 37 (Pl.)
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Ioff, I., & Efremowa, N., 894 (Z.)
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Ionnesco, D., 762 (Rab.)
Irisawa, T., & Sakamoto, T., (608) (Bb.)
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Ishikawa, S., with Morinaka, 188 (Hel.)
Ishiwara, K., with Futaki, Takaki, Taniguchi, Ohsumi & Ohtawara, 702 (Fev.)
Ishizu, Y., 99 (Jaun.)
Isobe, M., 183, 989 (Hel.)
Itagaki, S., & Makino, R., 995 (Hel.)
Italy, 727 (Mal.)
Ito, K., 172 (Hel.)
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Iwanow, E., & Mesnil, F., 972 (S.S.)
Iyer, A. S. V., 677 (Misc.)
Iyer, M. A. K., (856) (Misc.)
Izar, G., 785 (Am.)
—— & Mastrojeni, G., 620 (Und.)
Izawa, T., 802 (Dys.)
Izumi, M., with Katsurada & Kubo, 597 (Bb.)

J

Jackson, E. S., 897 (Z.)
Jaensch, P. A., 481 (Oph.)
Jaffé, R. H., & Brown, S., 588 (S.S.)
Jahnel, F., 694 (R.F.)
——, & Lange, J., 304 (Y. & S.)
James, S. P., (758) (Mal.)
James, W. M., 1 (Am.)
Jameson, P. C., 476 (Oph.)
Jamison, S. C., 155 (Misc.)
Jamot, E., 560 (S.S.)
——, with Tanon, 268 (Mal.), 833 (Misc.)
——, & Vernon, 961 (S.S.)
Jandula, R., (758) (Mal.)
Jansen, B. C. P., & Donath, W. F., 126, 607, (608) (Bb.)
Jassinowsky, M. A., 871 (Z.)
Jasudasin, F., with Fairley, 518 (Hel.)
Jatzenko, T., 427 (Z.)
Java, K. G., 479 (Oph.)
Jeanselme, E., 144 (K.A.)
——, & Burnier, 144 (K.A.)
——, & Eliascheff, O., 310 *bis* (Y. & S.)
Jermoljewa, S., 469 (Chl.)
Jessner, M., 311 (Y. & S.), 647 (K.A.)
Jettmar, H. M., 38 (Pl.)
Jirovec, O., with Breindl, (409) (Z.)
Joannidès, G. S., 846 (Misc.)
Joannovitch, G., 230 (Rab.)
Jobling, B., 433 (Z.)
Joff, I., with Wagner, 33 (Pl.)
Joffe, H., (758) (Mal.)
Joffe, W., with Hartoch & Schlossberger, 371 (Dys.)
Johannessohn, F., 85 (R.F.)
Johansen, F. A., with Lemann & Liles, 558 (Lep.)
Johns, F. M., 352 (Am.), 440 (Z.)
Johnson, T. L., with Taliaferro, 587 (S.S.)

Johnson, W. B., 90 (R.F.)
——, with Lloyd & Rawson, 891 (Z.)
Johnston, L. P., 315 (G.V.)
Jolly, G. G., 303 (Y. & S.)
Jona, A., 534 (Hel.)
Jones, P. H., with Turner, 12 (Am.)
Jonnesco, D., 223 (Rab.)
Jorge, R., 705 (Jaun.)
Jose, I. B., (73) (Misc.)
Joseph, A., 81, 694 (R.F.)
Joseph, G. W. N., & Manson, J. S., 803 (Dys.)
Jouenne, P., & Guillet, R., 552 (Lep.)
Joukowsky, J., 270 (Mal.)
Journal of the Burma Research Society, 499 (B.R.)
Joyeux, C., 858 (B.R.), 990 (Hel.)
Juhl, E., 803 (Dys.)
Juillet, A., & Espié, A., 543 (Hel.)
Junes, E., 476 (Oph.)
Junior, V., 720 (Y.F.)

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Kabeshima, T., 471 (Chl.), 712 (Jaun.)
Kadaner, M., 61 (Misc.)
Kagaia, Y., 902 (Z.)
Kakegawa, S., with Sugimoto & Yasuda, 606 (Bb.)
Kakihara, T., with Inouye, 465 (Chl.)
Kanagarayer, K., 1000 (Hel.)
——, with Fletcher, 794 (Dys.)
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——, with Lesslar, 91 (R.F.)
Kandelaki, S., 885 (Z.)
Kaneko, T., with Yano, Shimizu & Shirai, 163 (Hel.)
Kaplan, B., Williamson, C. S., & Geiger, J. C., 780 (Am.)
Kaplan, M. W., 373 (Dys.)
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Karnosh, L. J., with Driver & Gammel, 279 (Mal.)
Karpeles, F., & Blum, K., 536 (Hel.)
Katahira, S., 902 (Z.)
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Kato, Y., (452) (Der.), (544) (Hel.)
Katsurada, F., Izumi, M., & Kubo, K., 597 (Bb.)
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Kawanishi, K., with Oiso, 1005 (Hel.)
Kawata, K., 374 (Dys.)
Kawatani, S., 769 (Rab.)
Ke-Fang, Z., with Faust, 172 (Hel.)
Kehrer, J. K. W., & Oudendal, A. J. F., 541 (Hel.)
Kellersberger, E. R., 568 (S.S.)
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Kérandel, J., 64 (Misc.)
Kerr, I., 911 (Lep.)
Kerr, J. A., with Rickard, 539 (Hel.)
Kéruzoré, A., 676 (Misc.)
——, with Guillon, 737 (Mal.)
Kessel, J. F., 20, 356 (Am.), 393 (Z.)
——, with Svensson, 540 (Hel.)
Khalil, M., 161, 174, 516, 517 (Hel.)
Khan, G. P., with Shanks, 155 (Misc.)
Khan, K. M., 995 (Hel.)
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Khan, O. K., with Faust, Ke-Fang & Yung-an, 983 (Hel.)
Khartoum, Kitchener School of Medicine, 54 (Misc.)
Khaw, O. K., 171 (Hel.)
Kikuth, W., with Mayer & Borchardt, 831 (Misc.)
Kilkuth, W., with Regendanz, 973 (S.S.)
Kimura, H., with Moteki, (856) (Misc.)
King, G. E., 989 (Hel.)
King, H., (974) (S.S.)
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King, W. V., & Bradley, G. H., (285) (Mal.)
Kingsbury, A. N., 746 (Mal.)
——, & Kanagarayer, K., 793 (Dys.)
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Kirby, D. B., 1015 (Oph.)
Kirkpatrick, H., 472, 1011 (Oph.)
Kirschner, L., with Otten, 800 *bis* (Dys.)
Kitagawa, S., with Takahira, 605 (Bb.)
Klarenbeek, A., with Levaditi, 959 (S.S.)
Klein, B., 183 (Hel.)
Klein, L., 436 (Z.)
Kleine, F. K., 946 (S.S.)
Kligler, I. J., & Weitzman, I., 573, 575 (S.S.), 803 (Dys.)
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Knizawsky, A., with Nikanorov, 936 (Pl.)
Kobayashi, H., 162, 169, 170 (Hel.), 252 (Mal.), 794 (Dys.)
Kobayashi, K., 794 (Dys.)
Kobori, K., 184 (Hel.)
Koch, D. A., with Wagener, 138 (K.A.)
Koch, E. W., 535 (Hel.)
——, with v. Drigalski, (544) (Hel.)
Kofoid, C. A., 3 (Am.)
——, & Swezy, O., Boyers, L. M., 2 (Am.)
Kogan, D. A., 526 (Hel.)
Kogan, D., with Semenow, 980 (Hel.)
Kohgame, Y., & Asada, J., 1001 (Hel.)
Köhler, G., 247 (Misc.)
Kohn, S., 516 (Hel.)
Koidzumi, M., 252 (Mal.), 425 (Z.), 997 (Hel.)
——, Hiraishi, S., & Koino, H., 187 (Hel.)
Koino, H., 190 (Hel.)
——, with Koidzumi & Hiraishi, 187 (Hel.)
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Kolesnikoff, N., 108 (Und.)
Komori, K., with Yamada, 994 (Hel.)
Komp, W. H. W., with Barber & Hayne, 729 (Mal.)
Kondo, K., (285) (Mal.)
Kondo, M., with Higuchi, Hara, Narita & Matsuzawa, 605 (Bb.)
Kondo, S., 764, 768 (Rab.)
Kondo, Y., 658 (Bl.)
Konovalova, S., 936 (Pl.)
Koopmann, H., & Krüger, E., 376 (Dys.)
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Kopstein, P. F., 409 (Z.)
Ko-Ran, 471 (Chl.)
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Korke, V. T., 192, 531 (Hel.)
Korownikow, A. F., 896 (Z.)
Kotkis, A. J., Wachowiak, M., & Fleisher, M. S., 319 (Myc.)
Koumans, A. K. J., 1022 (B.R.)
Kouwenaar, W., (680) (Misc.), 705 (Jaun.)

Kovács, N., 468 (Chl.)
——, with Eisler, 467 (Chl.)
Krantz, W., 82, 86 (R.F.)
Kranzfeld, A., 229 (Rab.)
Kraus, R., 404 (Z.), 505 (B.R.)
——, & Michalka, J., 224 (Rab.)
Krause, E., 526, 991 (Hel.)
Krige, C. F., 760 (Rab.)
Krijgsman, B. J., 397, 398 (Z.)
Krinitzky, S. I., 224 (Rab.)
Krishnamurty, C., (758) (Mal.)
Kritchevsky, I., & Autonomov, V., 581 (S.S.)
Kritschewski, J. L., 689 (R.F.)
——, & Brussin, 690 (R.F.)
——, & Heronimus, E. S., 582 (S.S.)
Kritschewsky, I. K., & Tscherikower, R., (701) (R.F.)
Kritschewsky, I. L., 669 (Bl.)
Kritschewsky, L. W., 689 (R.F.)
Kroó, H., 84 (R.F.)
Krueger, A. P., with Proescher & Ryan, 322 (Myc.)
Krüger, E., with Koopmann, 376 (Dys.)
Kubo, K., with Katsurada & Izumi, 597 (Bb.)
Kudicke, R. & Borchardt, W., 511 (Hel.)
——, & Collier, W. A., 579 (S.S.)
——, & Weise, W., 167 (Hel.)
Kudo, R., 20 (Am.)
Kupffer, A., 916 (Lep.)
Kuruhashi, T., 996 (Hel.)
Kuwataro, 172 (Hel.)
Kwei, W. S., with Stoll & Cort, 981 (Hel.)

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Labernadie, V., 906 *bis* (Lep.)
Lacy, G. R., & Sellards, A. W., 297 (Y. & S.)
——, with Schöbl & Sellards, 300 (Y. & S.)
——, with Sellards & Schöbl, 297 (Y. & S.)
La Face, L., 424 (Z.)
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Lahiri, B. N., with Cunningham & Nicholas, 229 (Rab.)
Laidlaw, P. P., with Dobell, 363 (Am.)
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Lalung-Bonnaire, with Bablet, Guérin & Pons, 602 (Bb.)
——, with Bernard & Pons, 602 (Bb.)
——, with Pons, 603 (Bb.)
Lambert, A. C., 805 (Pél.)
Lambling, A., with Lesne & Marquezy, 247 (Misc.)
Lamborn, W. A., 862 (Z.)
Lampe, P. H. J., 518, 986 (Hel.)
Lamson, P. D., & Wing, R., 235, 674 (Misc.)
Landeiro, F., 215 (Lep.)
Landis, E. M., with Churchill & Glusker, 119 (Fev.)
Landsteiner, K., & Levine, P., 467 (Chl.)
Lane, C., 202 *bis*, 542, 1007 (Hel.)
Lang, M. C., 403 (Z.)
Lange, J., with Jahnel, 304 (Y. & S.)
de Langen, C. D., (285) (Mal.), 597 (Bb.), 1025 (B.R.)
Langeron, M., 74, 75 (B.R.)
Lara, C. B., with Wade, 909, 911 (Lep.)
de Lara, F., with Beretervide, 493 (Misc.)
Large, D. T. M., & Bonavia, V. J., 270 (Mal.)
Larrousse, F., 435 (Z.)
Lasnet, 716 (Y.F.)
——, with Rigollet, Motais, Dumas, Le Dentu & Camail, 160 (B.R.)
Lasta, C. G., with Esquivel, 763 (Rab.)
Laurent, J. M., 101, 103 (Y.F.)
Lavier, G., 952, 953 (S.S.)
Lazaresco, E., with Puscariu, 1013 (Oph.)
Lea, J. A., 1014 (Oph.)
Leach, H., 307 (Y. & S.)
League of Nations, (47) (Chl.), 857 (B.R.), 945 (S.S.)
Le Bourgo, 56 (Misc.)
Le Dantec, A., 666 (Bl.)
Ledentu, G., 567 (S.S.)
——, & Daude, J., 565 (S.S.)
——, with Rigollet, Motais, Dumas, Lasnet & Camail, 160 (B.R.)
——, & Vaucel, M., 956, 958, 962 (S.S.)
Lee, C. U., 529 (Hel.)
Lee, D. H. K., 671 (Misc.)
Lee, P., with Cooley, 670 (Misc.)
Léeb, F., with Flury, 513 (Hel.)
Le Fanu, G. E. H., 718 (Y.F.)
Lefèbvre, J., with Duhot & Crampon, 181 (Hel.)
Lefrou, G., 842 (Misc.)
——, with Blanchard, 659 (Bl.)
Le Gac, 688 (R.F.), 1004 (Hel.)
Legendre, J., 119 (Fev.), 889 (Z.)
Leger, M., 34 (Pl.), 132 (K.A.), (459) (Pl.), 514 (Hel.), 548, (922) (Lep.)
Legroux, C., with Catanei & Grosdemange, 445 (Der.)
Leichtentritt & Opitz, 589 (S.S.)
Leitch, J. N., 272 (Mal.)
Leiper, R. T., 510 (Hel.)
Lemaire & Thiodet, 182, 522 (Hel.)
——, ——, & Derrien, 523 (Hel.)
Lemaire, G., 182 (Hel.)
Lemann, I. I., Liles, R. T., & Johansen, F. A., 558 (Lep.)
Le Meillour, with Mesnard & Stefani, 734 (Mal.)
Lenzmann, R., 282 (Mal.)
Leon, M., 981 (Hel.)
Leon, N., (204), (Hel.)
Lépine, P., 148 (K.A,.), 627 (Fev.), 715 (Jaun.)
Le Prince, J. A., 729 (Mal.)
Le Roy des Barres, 271 (Mal.)
Lesbre, P., with Worms & Sourdille, 366 (Dys.)
Lesne, E., Marquezy, R., & Lambling, A., 247 (Misc.)
Lesslar, J. E., with Fletcher, 122, 123 *ter* (Fev.)
——, & Kanagarayer, K., 91 (R.F.)
Lestage & Souloumiac, 1015 (Oph.)
Lester, A. R., 877 (Z.)
Lestoquard, F., with Parrot, 147 (K.A.)
——, with Sergent, E., Parrot & Donatien, 387 (Z.)
de Lestrange-Trévise, with Fourneau & Tréfouël, M. & Mme., 674 (Misc.)
Letschenko, 899 (Z.)
Levaditi, C., & Klarenbeek, A., 959 (S.S.)
——, Nicolau, S., & Galloway, I., 569 (S.S.)
——, ——, & Schoen, R., 760 (Rab.)
Levine, P., with Landsteiner, 467 (Chl.)
Levy, D. J., & Pierson, M., 179 (Hel.)
Lévy, R., 409 *bis* (Z.)

Lewis, E., 289 (Pel.)
Lhuerre, H., 61 (Misc.)
Li, K. H., 260 (Mal.)
Li, T. M., 472 (Oph.)
Lieb, C. W., 1002 (Hel.)
de Liebermann, L., 475 (Oph.)
Liège, with Courtois-Suffit & Garnier, 111 (Und.)
Liégeois, M., & Foulon, 157 (Misc.)
Lieo, K. W. J., 462 (Chl.)
Liles, R. T., with Lemann & Johansen, 558 (Lep.)
Lim, C. E., 609 (Und.)
Limtcher, L. F., with Scriabin, Podiapolsky & Sankin, 982 (Hel.)
Lindeman, S. J. L., 763 (Rab.)
Lindemberg, A., 146 (K.A.)
Lindner, M. B., with Warren & Smith, 612 (Und.)
Lindsay, J. W., 405 (Z.)
Lindtrop, G. T., 202 (Hel.)
Lindtrop, H., 543 (Hel.)
Lippincott, L. S., 158 (Misc.)
Lipscomb, H. R., 783 (Am.)
Lister, F. S., 818 (Lab.)
Lister Centenary Exhibition, Wellcome Historical Medical Museum, 684 (B.R.)
Little, E. G., 212 (Lep.)
Little, H. G., with Shattuck & Coughlin, 315 (G.V.)
Little, J. P., 481 (Oph.), 544 (Hel.)
Llambias, J., 184 (Hel.)
——, & Mosto, D., 143 *bis* (K.A.)
Lloyd, L., 433 (Z.)
——, Johnson, W. B., & Rawson, P. H., 891 (Z.)
Lloyd, R. B., (680) (Misc.)
——, Muir, E., & Mitra, G. C., 558 (Lep.)
Lobo, V., 756 (Mal.)
Lodato, G., 835 (Misc.)
Loevenhart, A. S., & Stratman-Thomas, W. K., 674 (Misc.)
Loewenthal, W., 763 (Rab.)
van Loghem, J. J., 469 (Chl.)
Logue, J. B., & Morrison, Jr., O. B., 231 (Rab.)
Loiselet, J., 327 (B.R.)
van Loon, F. H. G., 824 (Misc.)
Lopes, A. J., with Strada, 960 (S.S.)
Lopez, V. J., 375 (Dys.)
Lopez Prior, A., 288 (Pel.)
Lopez-Rizal, L., with Fajardo & Padua, 284 (Mal.)
——, Gutierrez, P., & Fernandez, L., 296 (Y. & S.)
——, & Sellards, A. W., 302 (Y. & S.)
Lortat-Jacob & Morlass, 218 (Lep.)
Losey, R. R., with Berens, 477 (Oph.)
Lottico, S., with Crócco, (922) (Lep.)
Loubser, J. N. W., 437 (Z.)
Loukianoff, W. A., with Yakimoff, Galouzo, & Rastégaiff, 873 (Z.)
Lovewell, C. H., 758 (Mal.)
Low, G. C., 212, 911 (Lep.), 995 (Hel.)
——, & Cooke, W. E., 632 (K.A.)
——, & Sayers, E. G., 632 (K.A.)
Löwenberg, K., 763 (Rab.)
Lubinski, with Prausnitz, 712 (Jaun.)
Lubinski, H., 226, 230 (Rab.)
Ludlow, A. I., 355 (Am.), 999 (Hel.)
Luis Carrera, J., 545, 552 (Lep.)
Lumbroso, U., with Durand, 244 (Misc.)
——, with —— & Anderson, 245 (Misc.)
——, with Nicolle, 244 (Misc.), 1013 (Oph.)
Lupu, N. G., & Missirliu, V., (759) (Mal.)
Lussich-Matkovich, V., 1014 (Oph.)
Lustig, A., (40) (Pl.)
Lutrario, A., 1011 (Oph.)
Lyautey, (73) (Misc.)
Lynch, Jr., F. B., with Hayman, Jr., 708 (Jaun.)
Lyssenko, B., 511 (Hel.)

M

MacArthur, W. P., (40) (Pl.), 334, 349 (Hist.)
McCall-Smith, N., & Fraser, D. M. M., 802 (Dys.)
MacCallan, A. F., 474 (Oph.)
McCallum, F., with Cumpston, 929 (Pl.)
——, & Dwyer, J. P., 627 (Fev.)
McCarrison, R., 676 (Misc.)
McCord, J. B., 233 (Misc.)
McCulloch, W. E., 864 (Z.), 976 (Hel.)
McDermott, E. N., with Mackie, 93 (Fev.)
MacDonagh, E. J., 526 (Hel.)
McDonald, W. M., 771 (B.R.)
Macdowell, T. W., with Riding, 687 (R.F.)
Machado, L., with Orsini, 833 (Misc.)
McHattie, C., with Chadwick, 648 (K.A.)
Machwiladse, N., 292 (Pel.)
Maciel, H., 274 (Mal.), 519, 542 *bis* (Hel.)
McIlhenny, P. A., 553 (Lep.)
MacInnes, A., 901 (Z.)
McIntosh, J. A., 314 (G.V.)
MacKay, A. G., 957 (S.S.)
McKay, S., 897 (Z.)
McKendrick, A. G., 222, 483, 760 (Rab.)
McKenzie, A., 755 (Mal.)
Mackerras, I. M., 876 (Z.)
Mackie, F. P., with Fairley, 175 (Hel.)
Mackie, T. J., with Herzfeld, 93 (Fev.)
——, & McDermott, E. N., 93 (Fev.)
Maclean, G., 563, 954 (S.S.)
MacLeod, J. M. H., 212, 911 (Lep.)
McLoon, M., with Zahorsky, 869 (Z.)
Macmillan, R. J. A., 653 (Bl.)
McNaughton, J. G., 305 (Y. & S.)
MacQueen, J., 736 (Mal.)
Madan, K. E., 480 (Oph.)
Madras, 1019 (Oph.)
Magath, T. B., & Brown, P. W., 989 (Hel.)
——, & Sheard, C., 848 (Misc.)
Magli, P., 841 (Misc.)
Maire, G., & Pinto, D., 908 (Lep.)
Maitra, G. C., with Tomb, 460 *bis* (Chl.)
Majer, J., 757 (Mal.)
Makhviladzé, N., & Didebuladze, 509 (Hel.)
——, & Didebouliclzé, G., 543 (Hel.)
Malagueta, I., 729 (Mal.)
——, & Sampaio, O., 834 (Misc.)
Malaria Bureau No. 4 Health Bulletin No. 12, (903) (Z.)
Malayan Medical Journal, 704 (Jaun.)
Mallik, K. L. B., 29 (Dys.), 261 (Mal.)
Manabe, E., with Sasaki, 27 (Dys.)
Manalang, C., 194, 195, 201 *bis*, 203, 543, 997, 1006, 1009 (Hel.)
Mandelstamm, M., 731 (Mal.)
Mangalik, V., with Stott, 119 (Fev.)
Mann, W., 795 (Dys.)

Manson, J. S., with Joseph, 803 (Dys.)
Manson-Bahr, P., 53 (Misc.), 212 (Lep.), 697 (R.F.), 741, 746 (Mal.), 775 *bis* (Am.)
——, & Alcock, A., 414 (B.R.)
——, with Andrews, Thomson, Neame, Harvey & Moore, 958 (S.S.)
—— & Sayers, E. G., 650 (Bl.)
Manzoli, G., 790 (Am.)
Marcenac, with Phisalix, 406 (Z.)
Marcenac, M., 407 (Z.)
Marchal, J., with Durham & King, 572 (S.S.)
Marchoux, E., 256 (Mal.), 326 (B.R.), 345 (Hist.)
—— & Quilici, P., 270 (Mal.)
Marcou-Mutzner, 69 (Misc.)
de Mare, N., 115 (Und.)
Margeridon, P., 308, 313 (Y. & S.)
Marie, A. C., 222, 761, 764 (Rab.)
——, & Mutermilch, S., 765 (Rab.)
Marin Amat, M., 481 (Oph.)
Marini, (73) (Misc.)
Marinot, J., with Morin & Advier, 603 (Bb.)
Marquezy, R., with Lesne & Lambling, 247 (Misc.)
Marras, F. M., 456 *bis* (Pl.)
Marrey, P.. & Vaz, E., 801 (Dys.)
Marsh, R. G. B., with Rudolf, 752 (Mal.)
Marshall, W., (856 *bis*) (Misc.)
Martin de Nicolas, A., with Tapia, 618 (Und.)
Martin, S. H., 982 (Hel.)
Martinelli, G., (856) (Misc.)
Martini, E., 980 (Hel.), 255, (759), (Mal.), (903), (Z.)
Martins, T., 554 (Lep.)
Maruyama, Y., 39 (Pl.)
Marx, H., 869 (Z.)
Marzinowski, E. I., Pirogow, A. W., & Moschkowski, S. D., (95), (Fev.)
Mashimo, S., (928) (Chl.)
Maslennikowa, W. A., 926 (Chl.)
Massias, C. H., (73) (Misc.)
Mastier, with Aubaret, 476 (Oph.)
Mastrojeni, G., wih Izar, 620 (Und.)
Masucci, A. L., with Nino, 786 (Am.)
Mathis, C., 87 (R.F.)
——, & Galloway, I. A., 87 (R.F.)
Matsumoto, K., 185 (Hel.)
Matsumuro, H., with Fujimaki, 604 (Bb.)
——, with Hara & Takada, (608) (Bb.)
Matsuzawa, K., with Higuchi, Kondo, Haro & Narita, 605 (Bb.)
da Matta, A., 400 *bis* (Z.), 703 (Fev.)
Mattlet, G., 318 (Myc.)
de Mattos, E., 722 (Y.F.)
Mauritius, Rep. Bact. Lab., 818 (Lab.)
Maxcy, K. F., 625 (Fev.)
May, E., 236 (Misc.)
Mayer, M., 137 (K.A.)
——, Borchardt, W., & Kikuth, W., 831 (Misc.)
Mayr, J. K., 748 (Mal.)
Mazza, S., 134, 148, 642, 649 (K.A.), 488, 855 (Misc.)
——, & Arias, J. C., 135 *bis* (K.A.)
——, & Bernasconi, V., 145 *bis* (K.A.)
——, & Cossio Etchecopar, M., 529 (Hel.)
——, & Frías, D., 400, 894 (Z.)
Mazzolani, 601 (Bb.)
Mazzucconi, M., 613 (Und.)
Meerhoff, W., 1012 (Oph.)
Megaw, J. W. D., 837, 839 (Misc.)
Meggitt, F. J., 249 (B.R.)
Mekie, E. C., 437 (Z.)
Meleney, H. E., 844 (Misc.), 884 (Z.)
de Mello, F., 678, 679 (Misc.) (804) (Dys.)
de Mello, F. *et al*, 975 (Hel.)
——, & Alvares, J. M., (544) (Hel.)
——, & Cabral, J., 553, 555 (Lep.)
——, & Camotim, V., 649 (K.A.)
——, & Vernencar, H. M. P., 743 (Mal.)
Mello, U., & Poggio, C., 769 (Rab.)
Melnotte, P., & Farjot, A., 855 (Misc.)
Memmi, G., & Schulemann, W., 739 (Mal.)
——, with Schulemann, 738, 739 (Mal.)
Mendel, K., (285) (Mal.)
Mendelson, R. W., 697 (R.F.), 847, 849 (Misc.)
Mendoza, D., (313) (Y. & S.)
Mengert-Presser, H., & Donath, W. F., 855 (Misc.)
——, with —— & Oudendal, 490 (Misc.)
Menk, W., 4 (Am.), 152 (Misc.)
Merriam, H. E., with Carpenter, 110 (Und.)
Meslay & Cochez, 784 (Am.)
Mesnard, with Bablet & Polidori, 625 (Fev.)
——, with —— & Stéfani, 358 (Am.)
——, Stefani & Le Meillour, 734 (Mal.)
Mesnil, F., 851 (Misc.)
——, with Iwanow, 792 (S.S.)
Messieri, A., 619 (Und.)
Messik, R. E., 647 *bis* (K.A.)
Metalnikov, S., 386 (Z.)
Metzger, E., 152 (Misc.)
Meyer, K. F., & Batchelder, A., 243 (Misc.)
Michalka, J., with Kraus, 224 (Rab.)
Michel, with Trabaud, 787 (Am.)
Miessner, H., & Baars, G., 768 (Rab.)
Mikéladzé, C., 262 (Mal.)
Miller, Jr., H. M., 987 (Hel.)
Miller, L. E., 487 (Misc.)
Miller, N., 189 (Hel.)
Mills, R. G., 976 (Hel.)
Mills, L., 357 (Am.), 481 (Oph.)
Minervin, S., with Frise & Sdrodowskii, 613 (Und.)
Mironesco T., 698 (R.F.)
Mirri, A., 769 (Rab.)
Missirliu, V., with Lupu, (759) (Mal.)
Missiroli, A., 885 (Z.)
Mitchell, J. A., 905 (Lep.)
——, Pirie, J. H. H., & Ingram, A., 722 (B.R.)
Mitra, G. C., with Lloyd & Muir, 558 (Lep.)
Mitrofanova, Y., with Beklemishev, 426 (Z.)
Miyagawa, Y., 520 (Hel.)
Mó, A., with Bosch, 277 (Mal.)
Mochtar, A., with Schüffner, 714 (Jaun.), 721 (Y.F.)
Molesworth, E. H., 208 (Lep.)
Mollaret, P., with Hallè, 783 (Am.)
Momoyeda, S., with Sugimoto, Yasuda, Higuchi & Tanaka, 598 (Bb.)
Monastra-Abate, 872 (Z.)
Money, R. A., 264 (Mal.)
Monier-Vinard, (649) (K.A.)
Montel, R. & Pons, R., 447 (Der.)
Montes, J. E., (73) (Misc.), 127 (Bb.)
Montpellier, J., & Catanei, A., 320 (Myc.), 446 (Der.)
——, & Pinelli, A., 205 (Lep.)
Moore, G. D. F., 305 (Y. & S.)
Moore, J., with Andrews, Manson-Bahr, Thomson, Neame & Harvey, 958 (S.S.)

Moore, V. A., & Carpenter, C. M., 111 (Und.)
Morales Villazón, N., 940 (Pl.)
Morax V., 476 1014 (Oph.)
Moreira, J., 729 (Mal.)
Morenas, with Cade & Ravault, 68 (Misc.)
Morgan, J., 672 (Misc.)
Morgenroth, J., Abraham, L., & Schnitzer, R., 272, (285) (Mal.)
Morin, A., & Genevray, J., 80 (R.F.)
Morin, H. G. S., Advier, M., & Marinot, J., 603 (Bb.)
Morinaka, K., & Ishikawa, S., 188 (Hel.)
Morishima, K., 370 (Dys.)
Morischita, K., & Tsuchimochi, K., 436 (Z.)
Morishita, K., (285) (Mal.)
Moritsch, P., 404 (Z.)
Morlass, with Lortat-Jacob, 218 (Lep.)
Morris, R. M., 383 (Sp.)
Morrison, Jr., O. B., with Logue, 231 (Rab.)
Moschkowski, S. D., with Marzinowski & Pirogow, (95) (Fev.)
Moss, W. L., 306 (Y. & S.)
Mosto, D., & Brachetto Brian, D., (759) (Mal.)
——, with Llambias, 143 *bis* (K.A.)
Motais, with Rigollet, Dumas, Le Dentu, Lasnet & Camail, 160 (B.R.)
Moteki, K., & Kimura, H., (856) (Misc.)
Mouchet, R., 303 (Y. & S.)
Mouriquand, G., 294 (Pel.)
Mtchedlicze, I. Z., 978 (Hel.)
Muelchi, A. F., 493 (Misc.)
Mühlens, P., 12 (Am.), 58 (Misc.), 265 (Mal.), (410) (Z.), (804) (Dys.)
——, Dios, R. L., Petrocchi, J., & Zuccarini, J. A., 682 (B.R.)
——, & Fischer, O., 738 (Mal.)
Muir, E., 217, 904 *bis* 911 (Lep.)
——, with Lloyd & Mitra, 558 (Lep.)
Müller, H., & van Waveren, W. F. J., 827 (Misc.)
Muller, L., 26 (Dys.)
Müller, R., 348 (Hist.), 439 (Z.)
Mumford, E. P., 430 (Z.)
Muniz, J., 967 *bis* (S.S.)
——, with da Fonseca, 396 (Z.)
Münnich, G., 49 (Ent.), 181 (Hel.)
Murakami, K., 368 (Dys.)
Murat, E., 755 (Mal.)
Murata, S., with Odaka & Nagao, 513 (Hel.)
Muratowa, A., 281 (Mal.)
Muraz, (73) (Misc.)
Murphy, R. A., 253 (Mal.)
Murray, H. E., 534 (Hel.)
Murray, W. A., with Pirie, 454 (Pl.)
Musconi, L., 432 (Z.)
Mutermilch, S., with Marie, 765 (Rab.)
Muzii, M., 533 (Hel.)
Myers, J. G., 894 (Z.)

N

Nabarro, D., 367 (Dys.)
Nagano, K., 171, 513 (Hel.)
Nagao, S., with Odaka & Murata, 513 (Hel.)
Nagayo, M., 624 (Fev.)
Nägelsbach, E., 551 (Lep.), 824 (Misc.)
Naidu, B. P. B., & Shamsher Jang, 455, 457, 939 (Pl.)
Naito, K., with Shimamura, 606 (Bb.)
Nanhorya, H. B. D., 188 (Hel.)
Napier, L. E., 135 (K.A.), 672 (Misc.)
——, & Foster, P., 636 (K.A.)
——, & Smith, R. O. A., 638 (K.A.)
Narayana Rao, B. K., 478 (Oph.)
Narita, S., with Higuchi, Kondo, Hara & Matsuzawa, 605 (Bb.)
Naróg, F., 475 (Oph.)
Nauck, E. G., (759) (Mal.), 875 (Z.)
——, & Shan Yu, 162 (Hel.)
Navarro, R, J., 296 (Y. & S.)
Navarro, R., with Sison, A. G., Sison, A. B. M., & Ignacio, 678 (Misc.)
Nazareth, S., Gracias, E., & d'Araujo, A., 547 (Lep.)
Neame, H., 1018 (Oph.)
——, with Andrews, Manson-Bahr, Thomson, Harvey & Moore, 958 (S.S.)
Nedergaard, N., 59 (Misc.)
Negro, F., (759) (Mal.)
Nejrotti, M. G., 448 (Der.)
Neveu-Lemaire, M., 164 (Hel.), 863 (Z.)
——, with Germain, 439 (Z.)
Newman, R. E. U., & Davies, R. M., 14 (Am.)
Nicaud, P., 318 (Myc.)
Nicholas, M. J., with Cunningham & Lahiri, 229 (Rab.)
Nicholls, L., & Burgess, E., (51) (Ent.), 766 (Rab.)
Nicholson, D., with Cameron, 494 (Misc.)
Nicol, W. D., 751 (Mal.)
Nicolas, C., 834 (Misc.)
——, & Delgado, L. B., 551 (Lep.)
Nicolas, E., 482 (Oph.)
de Nicolas, M., with Tapia 113 (Und.)
Nicolau, S., 693 (R.F.)
——, with Levaditi & Galloway, 569 (S.S.)
——, with ——, & Schoeh, 760 (Rab.)
Nicole, J. E., & Steel, J. P., 280 (Mal.)
——, with ——, 750 (Mal.)
Nicolle, C., 58 (Misc.), (149) (K.A.), 1013 (Oph.)
——, & Anderson, C., 77 *bis* (R.F.), 134 (K.A.)
——, & Conseil, E., 451 (Der.)
——, & Lumbroso, U., 244 (Misc.), 1013 (Oph.)
Nieschulz, O., 889 (Z.)
Nigeria, 158 (Misc.)
Nigeria, Ann. Rep. Med. Res. Inst., 815 (Lab.)
Nikanoroff, S. M., 935 (Pl.)
Nikanorov, S. & Knizaevsky, A., 936 (Pl.)
Nikanorow, S. M., 933 (Pl.)
Nikitinsky, with Adova & Sebenzow, 883 (Z.)
Niles, G. M., 58 (Misc.)
Ninaud, 719 (Y. F.)
Niño, F. L., 592 *bis*, 593, 967 (S.S.)
——, & Masucci, A. L., 786 (Am.)
——, with Parodi, 28 (Dys.), 393 (Z.)
Nishigori, M., 985 (Hel.)
——, with Faust, 512 (Hel.)
Nissle, A., 368 (Dys.)
van Nitsen, R., 362 (Am.)
Nitzulescu, V., 429 *bis* (Z.)
Nobechi, K., 470 *bis* (Chl.)
Nochell, W., 758 (Mal.)
Noguchi, H., 120, 121, 622, 623 *bis* (Fev.), 139 (K.A.), 246 (Misc.), 1013 (Oph.)
—— & Tilden, E. B., 139 (K.A.)
Nojima, T., with Osawa, 918 (Lep.)
Normet, 62 (Misc.)
Norris, V. H., 625 (Fev.)
Nottebaum, (544) (Hel.)

de Novaes e Silva, S., 918 (Lep.)
Novaro, R., 524 (Hel.)
Núñez, S., 57 (Misc.)

O

Oba, T., (544) (Hel.)
Occhipinti, G., 262 (Mal.)
O'Connor, F. W., 379 (Dys.)
Odaka, Y., Murata, S., & Nagao, S., 513 (Hel.)
O'Farrell, W. R., with Smith, 515 (Hel.)
Ogata, S., 188, 203, 1002 (Hel.)
Ogata, T., (608) (Bb.)
Ogilvie, W. H., (928) (Chl.)
Ohashi, M., 763 (Rab.)
Ohsumi, S., with Futaki, Takaki, Taniguchi, Ishiwara & Ohtawara, 702 (Fev.)
Ohtawara, T., with Futaki, Takaki, Taniguchi, Ohsumi & Ishiwara, 702 (Fev.)
Ohtsubo, I., with Takano & Inouye, 463 (Chl.)
Oi, T., 1005 (Hel.)
Oiso, T., & Kawanishi, K., 1005 (Hel.)
Okada, J. K., (903) (Z.)
Okada, S., (608) (Bb.)
——, & Sakurai, E., 607 (Bb.)
Oldt, F., 984 (Hel.)
O'Leary, P. A., Goeckerman, W. H., & Parker, S. T., 279 (Mal.)
Oleinikov, S. V., 978 (Hel.)
Olivier, J., 55 (Misc.)
Oméliansky, W., with Zabolotny, 455 (Pl.)
Omori, K., 598 (Bb.)
Ongkiehong, H. F., 804 (Dys.)
Onomura, Y., 371 (Dys.)
Onorato, R., 239, 827 (Misc.), 443 (Der.), 513 (Hel.)
Opitz, with Leichtentritt, 589 (S.S.)
Orenstein, A. J., with Fischer, 1004 *bis* (Hel.)
Orsini, O., & Machado, L., 833 (Misc.)
Ortlepp, R. J., 529 (Hel.)
Osawa, Y., & Nojima, T., 918 (Lep.)
Oshima, F., with Hayashi, Eguchi & Hozumi, 624 (Fev.)
von Ostertag, 226 (Rab.)
Ota, M., 442 (Der.)
Otten, L., 243 (Misc.)
——, & Kirschner, L., 800 *bis* (Dys.)
Ouchakow, W. G., 766 (Rab.)
Oudendal, A. J. F., 185, 536 (Hel.), 283 (Mal.)
——, with Donath & Mengert-Presser, 490 (Misc.)
——, with Kehrer, 541 (Hel.)
Owen, H. B., 482 (Oph.)
Ozaki, Y., & Asada, J., 173 *bis* (Hel.)
Ozoux, M., 1005 (Hel.)

P

di Pace, I., 757 (Mal.)
Pacheco, G., 375 (Dys.)
Padilla, T., 258 (Mal.)
Padua, R. G., 284 (Mal.)
——, with Fajardo & Lopez-Rizal, 284 (Mal.)
——, with Rizal, 187 (Hel.)
Pages, A., with Sergent, Et. & Gueidon, 648 (K. A.)
Paget, H., (544) (Hel.)
Pagniez, P., 99 (Jaun.)
Pais, L., 919 (Lep.)
Pal, B. D., 22 (Am.)
Palavandoff, G. B., & Weinberg, B. G., 222 (Rab.)
Paldrock, A., (221), 557, 921, 922 (Lep.)
——, & Rängel, A., 917 *bis* (Lep.)
Palmer, F. J., 218 (Lep.), (928) (Chl.)
Pampana, E. J., 688 (R.F.)
Panayotatou, A., 70, 154, 247 (Misc.), 360 (Am.)
Panine, L. G., with Gloukhoff, Wolkowa & Eroussalimtchique, 372 (Dys.)
Pantaleoni, P., 543 (Hel.)
Paolini, R., 359 (Am.)
Papamarku, P., 964 (S.S.)
Papandrea, F., 163 (Hel.)
Paradiso, F., 131 (K.A.)
Parás, E. M., 922 (Lep.)
Pardo, J. M., 11 (Am.)
Parker, S. T., with O'Leary & Goeckerman, 279 (Mal.)
Parodi, S., & Niño, F. L., 28 (Dys.), 393 (Z.)
Parodi, S. E., 834 (Misc.)
Parrot, L., (410), 430 (Z.)
——, & Donatien, A., 141, 647 (K.A.)
——, & Foley, H., (149) (K.A.)
——, & Lestoquard, F., 147 (K.A.)
——, with Sergent, Edm. & Et., Donatien & Béguet, 140, 649 (K.A.)
——, with ——, & Foley, 641 (K.A.)
——, with Sergent, E., Donatien & Lestoquard, 387 (Z.)
de Pascalis, F., 237 (Misc.)
Paso, J. R., 35 (Pl.)
Patané, C., 885 (Z.)
Patarino, G. B., 148 (K.A.)
Paterson, G., 146 (K.A.)
——, & Shannon, R. C., 430 (Z.)
Paterson, G. C., 889 (Z.)
——, with Bernasconi, 643 (K.A.)
——, & Shannon, R. C., 889 (Z.)
Patton, W. S., 419 (Z.)
——, & Hindle, E., 130, 639 (K.A.), 389, 428 (Z.)
——, with ——, 137, 138, 639 (K.A.)
——, with —— & Hou, 138 (K.A.)
Paul, F., 981 (Hel.)
——, & Schweinburg, F., 760 (Rab.)
Paulson, M., & Andrews, J. M., 866 (Z.)
Pavia, G., 868 (Z.)
Pavlovsky, E. N., 164 (Hel.)
——, & Stein, A. K., 895 *bis* (Z.)
Pawan, J. L., 10 (Am.), 29 (Dys.), 67, (73) (Misc.), 999 (Hel.)
Pawlowa, O. N., 980 (Hel.)
Pawlowsky, E. N., 327 (B.R.)
Payne, F. K., with Payne, 829 (Misc.)
Payne, G. C., & Payne, F. K., 829 (Misc.)
Peacock, A. D., 433 (Z.)
Peall, G. H., with Ross, 662 (Bl.)
Pearse, A. S., with Hausheer & Herrick, 197 (Hel.)
Pearson, G. H., 829 (Misc.)
Pearson, M. G., 373 (Dys.)
Peck, S. M., with Kingsbury, 316 (G.V.)
Peco, G., with Escudero, P., & Escudero, A., 522 (Hel.)
Pellé, A., 697 (R.F.)
de Peñalva Torino, T. D., (759) (Mal.)
Pereira, J. R., 408, (410) (Z.)
Pérèkropoff, G. I., (410) (Z.)
Pérèkropoff, G. J., 276, 749 (Mal.), 659 (Bl.)

Perera, D., 201 (Hel.)
Pergher, G., 223 (Rab.)
Pernet, G., 911 (Lep.)
Peroni, G., 744, (759) (Mal.)
Peruzzi, M., 43 (Chl.), 67 (Misc.)
Perves, 627 (Fev.)
Pessoa, S. B., & Corrêa, C., 871 (Z.)
——, with Gomes, 699 (R.F.)
——, with Prado, 725 (Mal.)
——, da Silveira, G. F., & Corrêa, C., 523 *bis* (Hel.)
Petot, C., with Debré, 809 (Pel.)
Petraroia, M., 238 (Misc.)
Petridis, P. A., 21, 22, 785 (Am.)
Petrie, G. F., 796 (Dys.)
Petrocchi, J., with Mühlens, Dios & Zuccarini, 682 (B.R.)
Pettit, A., 98 (Jaun.)
Peyre, E., 246 (Misc.)
Peyre, E. L., 783 (Am.)
Peyrot, J., 90 (R.F.), 732 (Mal.)
Phillips, J., 247 (Misc.)
Phisalix & Marcenac, 406 (Z.)
Pickard, R. J., 780 (Am.)
Pierini, L. E., 549 (Lep.)
Pierson, M., with Levy, 179 (Hel.)
Pigoulewsky, S. W., 981 (Hel.)
Pilcz, A., 754 (Mal.)
Pineda, E. V., 908 (Lep.)
——, & Roxas-Pineda, E., 214 (Lep.)
Pinelli, A., with Montpellier, 205 (Lep.)
Piney, A. 774 (B.R.)
Pinto, C., 430 (Z.)
Pinto, D., with Maire, 908 (Lep.)
Pinto, F. da S., with Prates, 525 (Hel.)
Pires, W., 729 (Mal.)
Pirie, J. H. H., with Ingram, 37 (Pl.)
——, with Mitchell & Ingram, 772 (B.R.)
——, & Murray, W. A., 454 (Pl.)
Pirogow, A. W., with Marzinowski & Moschkowski, (95) (Fev.)
Pirot, R., 628 (Fev.)
Pittaluga, G., 640 (K.A.)
Piza, W., with Povoa, 729 (Mal.)
Placidi, L., with Costa & Boyer, 766 (Rab.)
Plantureux, E., 222, 227 *bis*, 228, 231, 766 (Rab.)
Plaut, A., (544) (Hel.)
Plaut, F., 82 (R.F.)
Plavtov, K. A., 509, 514 (Hel.)
Plehn, A., 669 (Bl.), 278, 732 (Mal.)
Plummer, B. A., (608) (Bb.)
Poche, F., 249 (B.R.)
Podiapolsky, V. P., with Scriabin, Sankin & Limtcher, 982 (Hel.)
——, with —— & Schoultz (1010) (Hel.)
Poggio, C., with Mello, 769 (Rab.)
Poleck, 757 (Mal.)
Polidori, with Bablet & Mesnard, 625 (Fev.)
Polychroniades, G., 738 (Mal.)
Pons, R., (40) (P.)
——, with Bablet, Guérin & Lalung-Bonnaire 602 (Bb.)
——, with Bernard & Lalung-Bonnaire, 602 (Bb.)
——, & Borel, E., 126 (Bb.)
——, & Chastel, 218 (Lep.)
——, & Lalung-Bonnaire, 603 (Bb.)
——, with Montel, 447 (Der.)
Popesco, C., 46 (Chl.)
Popoff, P. P., 977 (Hel.)
Popov, P., 443 (Der.)
Popova, S., 480 (Oph.)
Popow, P., with Wail & Prjadko, 186 (Hel.)
Popowski, S., with Brokman, 26 (Dys.)
Porter, A., 987 (Hel.)
Posey, W. C., 1012 (Oph.)
Postmus, S., with Sardjito, 711 (Jaun.)
Póvoa, H., & Piza, W., 729 (Mal.)
Prado, A., 427 (Z.)
——, & Pessoa, S. B., 725 (Mal.)
Prates, M. M., & Pinto, F. da S., 525 (Hel.)
Prausnitz, C., & Lubinski, 712 (Jaun.)
v. Preisz, H., 457 (Pl.)
Priest, R., 183 (Hel.)
Prigge, R., 81 (R.F.)
Pringle-Patterson, A. E. S., 247 (Misc.)
Prjadko, F., with Wail & Popow, 186 (Hel.)
Proceedings of the Royal Society of Medicine, 911 (Lep.), 958 (S.S.)
Procter, R. A. W., 841 (Misc.)
Proctor, A. H., 266 (Mal.)
Proescher, F., & Arkush, A. S., 671 (Misc.)
——, Ryan, F., & Krueger, A. P., 322 (Myc.)
Prommas, C., 985 (Hel.)
Puckett, C., 729 (Mal.)
Puente, J. J., 208 (Lep.)
Puiggari, I., with Fuchs, Ferro & Cramer, 1012 (Oph.)
Pullè, F., 789 (Am.)
Puntoni, L., 770 (Rab.)
Puntoni, V., 227 *bis*, 228, 765, 770 (Rab.)
Pupo, A., 207, 546 (Lep.)
Pupo, J. A., 145 *ter* (K.A.)
Pupo, J. de A., 219 (Lep.)
Puscariu, E., 476 (Oph.)
——, & Lazaresco, E., 1013 (Oph.)
Pussard, R., with Régnier, 242 (Misc.)

Q

Quéméner, E., 362 (Am.)
Quilici, P., with Marchoux, 270 (Mal.)
Quintana, H., & Alvarez Soto, N., 269, (759) (Mal.)
——, with ——, (758) (Mal.)

R

Rabit, with Hudelo, 825 (Misc.)
Rackemann, F. M., & Stevens, A. H., 988, (Hel.)
Radojičič, M. M., 738 (Mal.)
Radsma, W., 495 (Misc.)
Raetz, E., 146 (K.A.), 731 (Mal.)
Rajan, R. S., 238 (Misc.)
Raman, T. K., 629 (K.A.)
Raméry, 202 (Hel.)
Ramirez, J., with Schöbl, 302 (Y. & S.)
Ramón y Fañanás, J., 767 (Rab.)
Ramond, F., & Zizine, P., (73) (Misc.)
Ramos Báez, P., with Hoffmann, 209 (Lep.)
Ramos Mejia, C., 769 (Rab.)
Ramsay, J. C., with Rudolf, 279 (Mal.)
Rängel, A., with Paldrock, 917 (Lep.)
Rangel, D. M., 917 (Lep.), (940) (Pl.)
Rangel, M., 206, 220 *bis* (Lep.)
——, with da Rocha, 61 (Misc.)
Rastégaïff, E. F., with Yakimoff, Galouzo & Loukianoff, 873 (Z.)

Rattray, M. J., (544) (Hel.)
Raúl Goyena, J., 275 (Mal.)
Ravina, A., 760 (Rab.)
Ravault, P., with Cade & Morenas, 68 (Misc.)
Ravaut, P., 497 (B.R.)
Rawson, P. H., with Lloyd & Johnson, 891 (Z.)
Ray, J. C., 466 (Chl.)
Raynal, 454 (Pl.)
Raynal, J., 742 (Mal.)
Raynal, M. J., (40) (Pl.)
Raynaud, L., 515 (Hel.), 609 (Und.)
Reategui, J. V., 747 (Mal.)
Rebuffat, E., 307 (Y. & S.)
Reed, A. C., 53 (Misc.)
Rega, M., (285) (Mal.)
Regendanz, P., & Kilkuth, W., 973 (S.S.)
——, & Tropp, C., 971 (S.S.)
Régnier, R., & Pussard, R., 242 (Misc.)
Rehbein, M., 11 (Am.)
Reichenow, E., 353 (Am.)
Reisinger, E., 177 (Hel.)
Reitano, R., 734 (Mal.)
Reiter, H., 241 (Misc.)
Reitler, R., 745 (Mal.)
Remlinger, P., 163 (Hel.), 760, 762 (Rab.)
——, & Bailly, J., 761, 764, 766 *bis* (Rab.)
——, with Charrier, (758) (Mal.)
Rennescu, N., with Ballif & Reznic, 293 (Pel.)
Renzo, A., (940) (Pl.)
Repetto, R., 666 (Bl.)
Repper, E. N. D., 42 (Chl.)
Revue de Médecine et d'Hygiène Tropicales, 718 (Y.F.)
Reynaud, G., 69 (Misc.)
de Rezende, M. O., 644 (K.A.)
Reznic, A., with Ballif & Rennescu, 293 (Pel.)
Rhamy, B. W., 323 (Myc.)
Rhodes, W. F., 373 (Dys.)
Rice, E. M., 1009 (Hel.)
Richardson, S., 626 (Fev.)
Richert, G., 810 (Pel.)
Rickard, E. R., & Kerr, J. A., 539 (Hel.)
Rico, J. T., 533 *bis*, 543 *ter* (Hel.)
Riding, D., & Macdowell, T. W., 687 (R.F.)
Rigollet, Motais, Dumas, R., Le Dentu, R., Lasnet & Camail, 160 (B.R.)
Riley, W. A., & Watson, C. J., 68 (Misc.)
Rippon, T. S., 1019 (Oph.)
Riva, A., with de la Barrera, 978 (Hel.)
Rizal, L. L., & Padua, R. G., 187 (Hel.)
Rizzo, C., 987 (Hel.)
Robertson, A., with Thomson, 576 (S.S.)
Robertson, R. C., & Anning, C. C. T., (928) (Chl.)
Robic, J., with Girard, 762 (Rab.)
Robinson, E. M., 578 (S.S.)
Robitschek, W., 529 (Hel.)
da Rocha, F., & Rangel, M., 61 (Misc.)
Rochaix, A., 761, 766 (Rab.)
Rockefeller Foundation, 1023 (B.R.)
Rodenwaldt, E., 422 (Z.)
Rodhain, J., 396 *bis*, 399, 872 (Z.)
Rodriques, J. S. N. H., 509 (Hel.)
Rodriguez, J. N., 210, 550 (Lep.)
Roegholt, M. N., 151 (Misc.)
Roehl, W., 264, 738 (Mal.)
Roffo, A. H., 555 (Lep.)
Roger, H., 112 (Und.)
Rogers, L., 41, 924 (Chl.), 212, 911 (Lep.)
Rohardt, W., (940) (Pl.)
de Roma, G., 261 (Mal.)
Roman, B., & Burke, A., 519 (Hel.)
Romero Sierra, J. M., 496 (Misc.)
Ronnefeldt, F., 758 (Mal.)
Root, F. M., 423, 884, 885 (Z.)
Rose, F. G., 186 (Hel.)
Rosenberg, E., with Schnitzer, 571 *bis* (S.S.)
Rosenholz, H. P., 685 (R.F.)
Ross, G. R., & Peall, G. H., 662 (Bl.)
Ross, I. C., 489 (Misc.)
Ross, J. A., (73) (Misc.)
Rossi, P., 429 (Z.)
——, with Senevet, 436 (Z.)
Rossignoli, J. J., 902 (Z.)
Roth, E. J. H., 180 (Hel.)
Roubaud, E., & Colas-Belcour, J., 885, 888, (Z.)
Roukhadzé, N., 427 (Z.), 727 (Mal.)
Row, R., 53 (Misc.)
Row, Y. S., 534 (Hel.)
Roxas-Pineda, E., with Pineda, 214 (Lep.)
Roxburgh, A. C., 900 (Z.)
Roxo, H., 729 (Mal.)
Roy, A. C., 273 (Mal.)
Roy, D. N., 879 (Z.)
Royer, M., 407 (Z.)
Roznatovsky, J. P., 109 (Und.)
Rubino, M. C., 215, 557 (Lep.)
Ruder, F. B., 721 (Y.F.)
Rudolf, G. de M. & Marsh, R. G. B., 752 (Mal.)
——, & Ramsay, J. C., 279 (Mal.)
Ruh, H. O., with Dembo, Fargo & Taylor, 93 (Fev.)
Rukawischnikoff, E., 826 (Misc.)
Russell, A. J. H., (47) (Chl.)
——, & Sundararajan, E. R., 923 (Chl.)
Russell, E. V., 734 (Mal.)
Russell, F. F., 1023 (B.R.)
Russell, P. F., with Barnes, 192, 544 (Hel.)
Russian Journal of Tropical Medicine, 255 (Mal.)
Russo, V., 703 (Fev.)
Ruys, A. C., 94 (Fev.)
Ryan, F., with Proescher & Krueger, 322 (Myc.)

S

Sabrazès, J., 304 (Y. & S.), 710 (Jaun.)
Sack, A., 850 (Misc.)
Saiki, T., 857 (B.R.)
Sailer, J., 100 (Jaun.)
Saisawa, K., & Tanabe, B., 23, (381) (Dys.)
Saito, M., 189 (Hel.)
Saito, S., with Fujii & Shionoya, 203 (Hel.)
Sakamoto, T., with Irisawa, (608) (Bb.)
Sakurai, E., with Okada, 607 (Bb.)
Sakurai, H., 557, 920 (Lep.)
Salvati, 475 (Oph.)
Sambon, L. W., (544) (Hel.)
Sampaio, O., with Malagueta, 834 (Misc.)
Samsonov, P. S., 80 (R.F.)
Sanarelli, G., 698 *bis* (R.F.)
Sandground, J. H., 184 *bis*, 185 (Hel.)
Sanfilippo, E., 615 (Und.)
——, with Ascoli, 615 (Und.)
Sangiorgi, G., 616 (Und.)
Sanguinetti, L. V., with Bonorino Udaondo, 263 (Mal.)

Sankin, with Scriabin, Podiapolsky & Limtcher, 982 (Hel.)
Santra, I., 905 (Lep.)
Sanyal, C. C., 634 (K.A.)
Sappington, H. O., 729 (Mal.)
Sardjito, M., 25, 27, 372 (Dys.)
——, & Postmus, S., 711 (Jaun.)
Sarkar, S. L., 238 (Misc.)
Sartory, A., & Sartory, R., 441 (Der.)
Sartory, R., with Sartory 441 (Der.)
Sasaki, R., 1001, (Hel.)
——, & Manabe, E., 27 (Dys.)
Sata, A., 924 (Chl.)
Sato, S., 399 (Z.)
Sautet, J., 19 (Am.)
——, with Carvaillo, 18 (Am.)
Savage, P., 264 (Mal.)
Savateef, A., 241 (Misc.)
Savery, H. M., with Hardym, 702 (Fev.)
Savino, E., 584 (S.S.)
Sawada, T., with Takagi & Segi, 713 (Jaun.)
Sayers, E. G., with Low, 632 (K.A.)
——, with Manson-Bahr, 650 (Bl.)
Scanlon, R. W., 553 (Lep.), 644 (K.A.)
Schadelbauer, Jr., K., 340 (Hist.)
Schapiro, L., (759) (Mal.)
——, & Stoll, N. R., 1009 (Hel.)
Scharff, J. W., (544) (Hel.)
Scharpff, W., & Schneller, 533 (Hel.)
Schern, K., 594 (S.S.), 768, 769 (Rab.)
Schilling-Siengalewicz, S., (680) (Misc.)
Schingarew, N., 424 (Z.)
Schlossberger, H., 1022 (B.R.)
——, with Hartoch & Joffe, 371 (Dys.)
Schlossmann, C., 698 (R.F.)
Schmidt, H. B., 179 (Hel.)
Schmidt-Weyland, P., 765 (Rab.)
Schneider, A., with Elkeles, 24, 792 (Dys.)
Schneider, H., 525 (Hel.)
Schneller, with Scharpff, 533 (Hel.)
Schnitzer, R., 571 *bis* (S.S.)
——, with Morgenroth & Abraham, 272, (285) (Mal.)
——, & Rosenberg, E., 571 *bis* (S.S.)
——, & Silberstein, W., 571 (S.S.)
Schnürer, J., & David, H., 769 (Rab.)
Schöbl, O., 369 (Dys.), (680) (Misc.)
——, & Ramirez, J., 302 (Y. & S.)
——, Sellards, A. W., & Lacy, G. R., 300 (Y. & S.)
——, with —— & ——, 297 (Y. & S.)
——, & Villaamil, R., 24 (Dys.)
Schoen, R., with Levaditi & Nicolau, 760 (Rab.)
Schopfer, W. H., (204) (Hel.)
Schoultz with Scriabine & Podyapolska (1010) (Hel.)
Schoute, E., with de Buch & Swellengrebel, 879, 880 (Z.)
Schreuder, J. J. C., 549 (Lep.)
Schreus, H. T., 694 *bis* (R.F.)
——, & Weisbecker, H., 84 (R.F.)
Schröpl. E., 452 (Der.), 535 (Hel.)
Schüffner, 709 (Jaun.)
Schüffner, W., 537 (Hel.)
——, & Mochtar, A., 714 (Jaun.), 721 (Y.F.)
——, & Sieburgh, G., 709 *bis* (Jaun.)
Schulemann, W., & Memmi, G., 738, 739 (Mal.)
——, with Memmi, 739 (Mal.)
Schumacher, C., 570 (S.S.)
Schumacher, J., 282 (Mal.)
Schur, H., 378 (Dys.)
Schuurmann, C. J., & Schuurmann Ten Bohkel Stuinink, A., 393 (Z.)
Schuurmann Ten Bohkel Stuinink, A., with Schuurmann, 393 (Z.)
Schwartz, B., 189 *bis* (Hel.)
Schwartz, L., 788 (Am.)
Schweinburg, F., with Paul, 760 (Rab.)
Schwenck, J., 997 (Hel.)
Schwetz, J., 501 (B.R.), 876, 893, 898 *ter* (Z.)
Scriabin, K. L., Podiapolsky, V. P., Sankin & Limtcher, L. F., 982 (Hel.)
Scriabine, C. J., & Podyapolska, V. P., & Schoultz, (1010) (Hel.)
Sdrodowskii, P., with Frise & Minervin, 613 (Und.)
Sealy, G. O. F., 924 (Chl.)
Sebenzow, with Adova & Nikitinsky, 883 (Z.)
Sédan, J., 1015 (Oph.)
Ségal, J., 380, (381) (Am.)
Segi, M., with Takagi & Sawada, 713 (Jaun.)
Segura, G., 777 (Am.)
Seidelin, H., 850 (Misc.)
Séjournant, (903) (Z.)
Selisky, A. B., 449 (Der.)
Sellards, A. W., 720 (Y.F.)
——, & Baetjer, W. A., 787 (Am.)
——, with Lacy, 297 (Y. & S.)
——, ——, & Schöbl, O., 297 (Y. & S.)
——, with Lopez-Rizal, 302 (Y. & S.)
——, with Schöbl & Lacy, 300 (Y. & S.)
——, with Theiler, 709 (Jaun.)
Semenow, G., 980 (Hel.)
——, & Kogan, D., 980 (Hel.)
Semionow, G. M., & Garmatty, K. I., 982 (Hel.)
Sen., A. K., 928 (Chl.)
Sen, P. B., with Brahmachari, 232 (Misc.)
Senevet, G., & Rossi, P., 436 (Z.)
——, & Witas, P., 520 (Hel.)
Sen Gupta, S. C., with Hermitte & Biswas, 30 (Dys.)
Senior-White, R., (285) (Mal.)
——, & Williamson, K., 257 (Mal.)
Séno, R., 541 (Hel.)
Sepulcri, P., 440, 884 (Z.)
Sequeira, J. H., 212, 911 (Lep.)
Serbinov, I. L., 291 (Pel.)
Sergent, E., 812 (Lab.)
——, Parrot, L., Donatien, A., & Lestoquard, F., 387 (Z.)
Sergent, Edm. & Et., Foley, H., & Parrot, L., 641 (K.A.)
——, Parrot, L., Donatien, A., & Béguet, M., 140 (K.A.)
——, ——, ——, & Béguet, M., 649 (K.A.)
Sergent, Et. & Catanei, A., (285) (Mal.)
——, Gueidon, E., & Pagès, A., 648 (K.A.)
Serigós, E., 522 (Hel.)
Serio, F., 283 (Mal.)
Serra, A., 213 (Lep.)
Serravalle, G., with Cremona, 763 (Rab.)
Seshachalam, T., 899 (Z.)
Sette, N., with Alessandrini, 242 (Misc.)
Severn, A. G. M., 421 (Z.), 724 (Mal.)
Seyfarth, C., 76 (B.R.)
Shamsher Jang, with Naidu, 455, 457, 939 (Pl.)
Shanks, G., 10 (Am.)
——, & Khan, G. P., 155 (Misc.)
Shannon, R. C., with Paterson, 430, 889 (Z.)

Shan Yu, with Nauck, 162 (Hel.)
Sharp, N. A. D., 35 (Pl.), 995 *bis* (Hel.)
Shattuck, G. C., Little, H. G., & Coughlin, W. F., 315 (G.V.)
——, with Strong, Bequaert & Wheeler, 324 (B.R.)
Shaw, V. A., 309 (Y. & S.)
Sheard, C., with Magath, 848 (Misc.)
Shelley, H. M., 287, 806 (Pel.)
Shepard, C. A., & Fleming, W. D., 384 (Sp.)
Sherwood, J. W., 900 (Z.)
Shiga, K., 125 (608) (Bb.), 369 (Dys.), 551 (Lep.)
Shillinger, J. E., 979 (Hel.)
——, with Hall, 166, 167 (Hel.)
Shimamura, T., 188 (Hel.)
——, & Naito, K., 606 (Bb.)
Shimazono, J., 598 (Bb.)
Shimizu, T., with Yano, Shirai & Kaneko, 163 (Hel.)
Shimkin, N., 473 (Oph.)
Shionoya, H., with Fujii & Saito, 203 (Hel.)
Shirabe, M., (608) (Bb.)
Shirai, M., 168, 984, 1006 (Hel.)
Shirai, S., with Yano, Shimizu & Kaneko, 163 (Hel.)
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Archives des Instituts Pasteur de l'Afrique du Nord (Algiers & Tunis) ...	1921–22	Vols.	1–2
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Proceedings of the Medical Association of the Isthmian Canal Zone [formerly *Proceedings of the Canal Zone Medical Association*] (*Mount Hope, C.Z.*) ...	1908–23	Vols.	1–13
Reports of the Sleeping Sickness Commission of the Royal Society (London) ...	1903—	No.	1—
Scientific Memoirs by Officers of the Medical & Sanitary Department of the Government of India (Calcutta) ...	1902–12	(New Ser.)	Nos. 1–60
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NOTE.—The Director would consider proposals for the exchange of the Bureau publications with other medical and scientific journals in which original papers on hygiene, tropical diseases or parasitology are published.

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Boletin de la Oficina Sanitaria Panamericana (*Washington*)	1922—	Vol.	1—	
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Bulletin du Comité d'Etudes Historiques et Scientifiques de l'Afrique Occidentale Française (Gorée)	1924—	Vol.	7—	
Bulletin of the New York Academy of Medicine (New York)	1925—	2nd Ser.		Vol 1—
Centralblatt für Bakteriologie (Jena)				
1. Abteilung. Referate	1902—	Vol.	31—	
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Comptes Rendus de l'Académie des Sciences (Paris)	1910—	Vol.	150—	
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Mitteilungen aus der medizinischen Akademie zu Keijo (*Keijo*)	1917—	Vol.	1—	
Mitteilungen aus dem Zoologischen Museum in Berlin	1910—	Vol.	5—	
North American Veterinarian (Chicago)	1928—	Vol.	9—	
Omsky Medizynsky Journal (*Omsk*)	1926—	Vol.	1—	
Orvosi Hetilap (Budapest)	1923—	Vol.	67—	
Physiological Abstracts (London)	1927—	Vol.	12—	
Porto Rico Review of Public Health and Tropical Medicine (San Juan)	1927—	Vol.	3—	
Quarterly Cumulative Index Medicus (*Chicago*) ...	1927—	Vol.	1—	
Records of the Indian Museum (Calcutta)	1916—	Vol.	12—	
Sanidad y Beneficencia (Habana)	1910—	Vol.	3—	
Transactions of the South Indian Branch of the British Medical Association (Madras)	1899—	Vol.	8—	
Tropical Agriculture (*Trinidad*)	1924—	Vol.	1—	
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